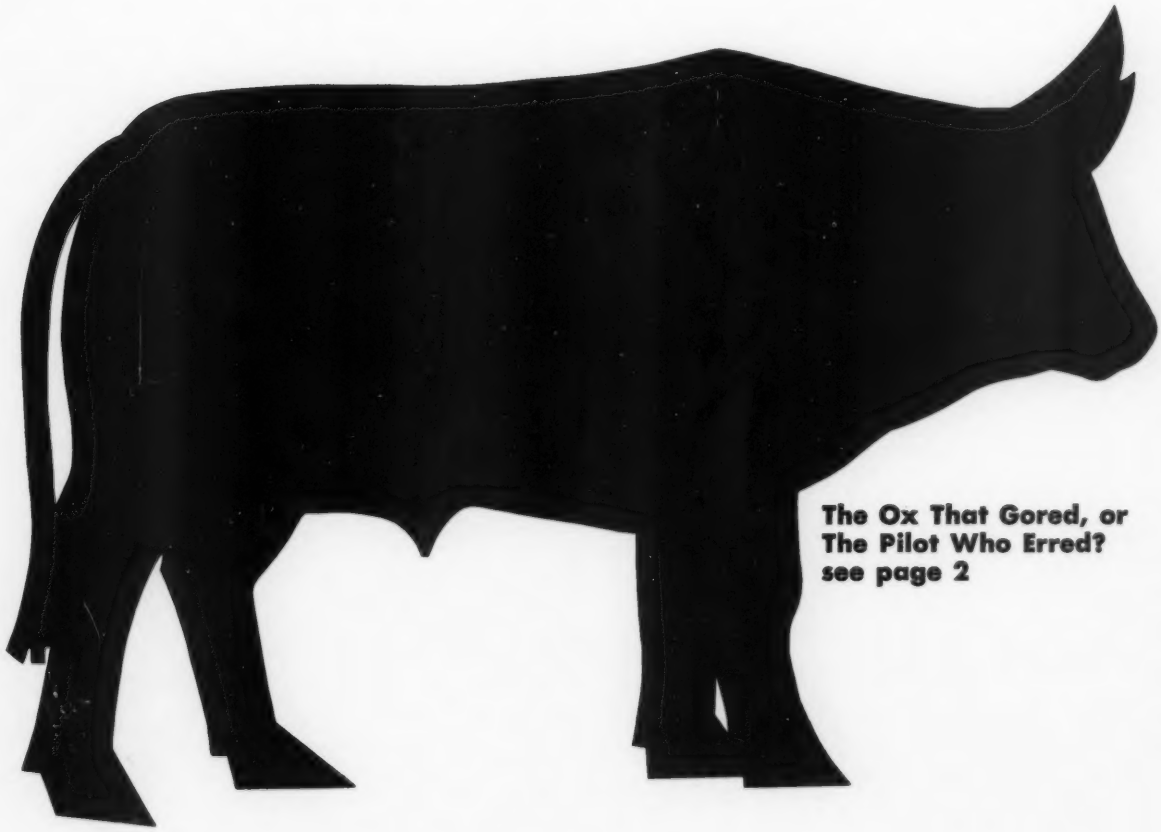
UNITED STATES ARMY NOVEMBER 1973

AVIATION DIGEST

When an ox gores a man or a woman to death, the ox shall be stoned, and its flesh may not be eaten; the owner of the ox shall be free from liability. If, however, the ox has for some time past been a vicious animal, and the owner has been duly warned but has not kept it under control, and the ox kills a man or a woman, then *the ox shall be stoned, and the owner be put to death as well.*

EXODUS 21:28-29



The Ox That Gored, or The Pilot Who Erred?
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UNITED STATES ARMY AVIATION DIGEST

NOVEMBER 1973 VOLUME 19 NUMBER 11

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ABOUT THE COVER

"The ox that gored" is depicted in this photo taken from a trailing helicopter just seconds before this unsafe act resulted in two fatalities and a destroyed aircraft

See page 2

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

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Articles, photos, and items of interest on Army aviation are invited. Direct communication is authorized to: Editor, U. S. Army Aviation Digest, Fort Rucker, AL 36360.

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VIEWS FROM READERS

Sir:

As the American Aviation Historical Society's research historian for the Bell AH-1G, I would like to enlist your aid in clarifying one point dealing with the history of the armed helicopter.

Reference the September 1971 issue of AAD, quoting *Armed Helicopters Around the World* by LTC C. O. Grininger, page 21 "... The United States' first armed helicopter company was *activated in Okinawa on 25 July 1962.* Its original mission was to provide troop transport. This unit, the Utility Tactical Transport Helicopter Company, was deployed to the Republic of Vietnam in October 1962 under the command of the late LTC Robert Runkle. It spent considerable time in Thailand readying for combat, *then arrived in Vietnam on 9 October and received its baptism of fire 7 days after that.*" The article further states, on page 22, the 334th Avn Co was the successor to the UTT Co.

I served with the 334th Avn Co and possess a unit history published by the company on 25 March 1971. Quoting from page 2 of this history "... The Utility Tactical Transport Helicopter Company (UTT) was *activated on 15 July 1961 on Okinawa.* In its first year of existence it experimented with various jury-rigged armament systems to be mounted on UH-1A helicopters. At the completion of its initial training period the UTT was sent TDY to Thailand in the summer of 1962 to participate in a large scale SEATO exercise. The unit passed its first test with flying colors and was ordered PCS from Thailand to the Republic of Vietnam to meet the growing threat of communist insurgency there. *Advance elements of the UTT arrived at Ton Son Nhut Air Base on 25 July 1962 and the company flew its first combat mission nine days later.*"

You will note the obvious difference in dates. Which version is correct? Your assistance is urgently needed and will be gratefully appreciated.

James D. Sprinkle
8516 E. 11th St.
Tulsa, OK 74112

• Thank you for your letter of 2 September 1973, regarding the activation date of the Utility Tactical Transport Helicopter Company (UTT).

After researching the matter, we found that both the date published in the DIGEST and the date you obtained from the 334th Aviation Company's source are incorrect. The DIGEST article's reference is the UTT's year booklet ROCKET (October 1962-January 1964).

It appears that typographical errors occurred in both cases. The 334th's unit history cites 15 July 1961; the UTT's, 25 July 1962. Records researched at the Department of the Army reveal that the UTT was activated on 25 July 1961. Also, personnel records of various individuals assigned to the UTT confirm this date.

The UTT, then, arrived in Vietnam on 9 October 1962, as recorded in the DIGEST, and received its baptism of fire 7 days after that. These dates are based on the UTT's ROCKET and on conversations with individuals assigned to the UTT. The DIGEST still is seeking additional official information to confirm the Vietnam arrival and baptism of fire dates. To do this it is necessary to obtain the UTT's TDA number, and this will take a little more time for reasons too involved to explain here. (However, if anyone has the TDA number the DIGEST would appreciate hearing from you.) When the DIGEST does receive additional information it will share it with you and its readers.

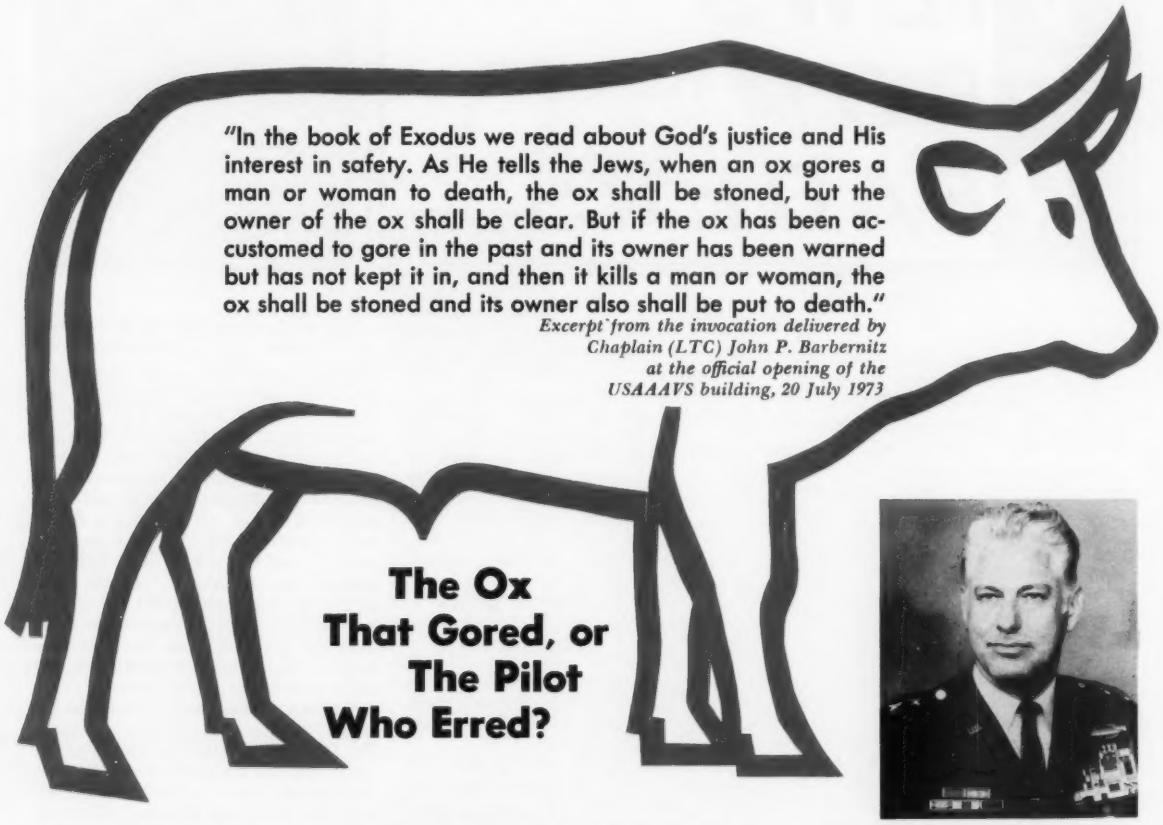
One other point has been brought out in the research of the UTT's activation. The DIGEST article's statement that the 334th was the successor to the UTT is not literally true. The 334th was a TOE unit. The UTT was established for testing purposes as a TDA unit. It, therefore, cannot accrue either campaign participation or decorations. However, it is true that the expertise, and some of the personnel and hardware did go over to the 334th from the UTT.

The DIGEST is especially grateful for the continuing assistance it has been receiving on this matter from Mr. Warner Stark of the Office of the Chief of Military History and Mr. Herbert Smith of the Organization and Directory Branch of The Adjutant General's Office.

Continued on page 28

MAST helicopters are saving lives ...
see stories beginning on pages 6, 7, 10 and 11

Major General William J. Maddox Jr.
Commanding General of Ft. Rucker and Commandant, USAAVNS
Former Director of Army Aviation, OACSFOR



"In the book of Exodus we read about God's justice and His interest in safety. As He tells the Jews, when an ox gores a man or woman to death, the ox shall be stoned, but the owner of the ox shall be clear. But if the ox has been accustomed to gore in the past and its owner has been warned but has not kept it in, and then it kills a man or woman, the ox shall be stoned and its owner also shall be put to death."

Excerpt from the invocation delivered by Chaplain (LTC) John P. Barbernitz at the official opening of the USAAAVS building, 20 July 1973

The Ox That Gored, or The Pilot Who Erred?

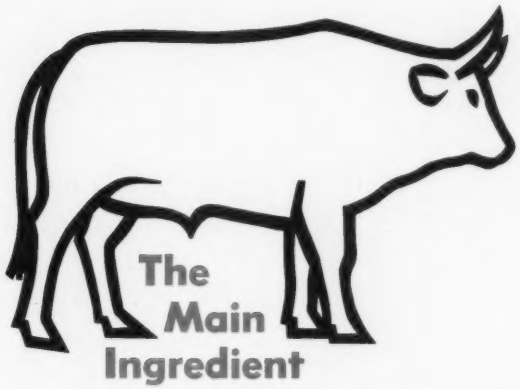
EVEN THOUGH the letter of the Mosaic law is no longer applied in many instances, the moral obligation—"the righteousness"—of the law still prevails today. Saint Paul called the Old Testament law "our schoolmaster"; we are to learn its lessons.

The commander has a lesson to be learned from the law of the ox that gored. The righteousness of this law teaches him, simply, that he is morally responsible for what his people do on the job.

This obligation seems to me to be especially binding in areas where life may be placed in jeopardy. If a pilot operates his aircraft in an unsafe manner and his commander does not take the action necessary to keep him and other pilots from repeating the unsafe acts, then the moral responsibility for any future injury or death that may result from *repetition* of unsafe practices rests squarely with the commander. He must accept the fact that positive corrective action on his part most likely would have prevented a second occurrence.

Of course, the aviation commander can keep all his aircraft on the ground and preclude any unsafe flying. But it's not that simple. He has a tactical as well as a moral obligation, and he must find a way both to live within the spirit of the law and to accomplish his mission. He can discharge both his obligations by following two basic procedures: applying proven accident prevention measures to mission accomplishment before the fact, and taking positive remedial action in individual cases after the fact.

Arnold R. Lambert
Directorate for Education and Prevention
USAAAVS



WHAT ARE THE ingredients for a really tragic aircraft accident? They vary from time to time but here are the ingredients found in a single accident report from the USAAAVS files.

Take one overconfident maintenance officer/test pilot who is tired. Give him a UH-1 and put him in an aviation unit that has no SOP for test flights. Place these ingredients on an airfield during normal nonduty hours when the tower is not in operation.

Add one technical inspector, two UH-1 crew chiefs, one OH-58 crew chief and one platoon sergeant and then have them perform some maintenance on the UH-1. Test fly the aircraft for 30 minutes, then make some final adjustments and prepare for another test flight.

After the first flight, forget about the postflight inspection and, prior to the second flight, forget about the preflight and ignore the checklist. Prior to the second flight, add three unauthorized passengers and perform the test flight at high speed, low level and over water.

Now the stage is set, but the main ingredient is still missing. Add a generous helping of inadequate command supervision and you have everything you need for a really tragic accident.

Description of the Accident

The maintenance officer, technical inspector, two UH-1 crew chiefs, an OH-58 crew chief and the platoon sergeant were all working on a UH-1D during normal nonduty hours. The main rotor and tail rotor were tracked and the maintenance officer, acting as maintenance test pilot, performed a 30-minute test flight. He felt that additional adjustments were required to properly track the main rotor. Adjustments were made on the trim tab and they prepared for a second test flight.

The crew for the second test flight was the maintenance officer/test pilot and a UH-1 crew chief. Along just for the ride were the maintenance officer's pregnant wife, his 18-month-old son and the OH-58 crew chief.

The test pilot took off and climbed to about 300 feet agl and flew crosswind at 80 knots airspeed. As he turned downwind, he nosed the aircraft over about 10 to 15 degrees to increase airspeed for a high-speed check on the main rotor system. Aircraft speed increased and rate of descent was estimated at 600 fpm over a reservoir. The pilot continued the descent until reaching what he thought was 50 to 100 feet agl. As he began to level, the aircraft impacted the water at an estimated 115 knots airspeed and 300 fpm rate of descent.

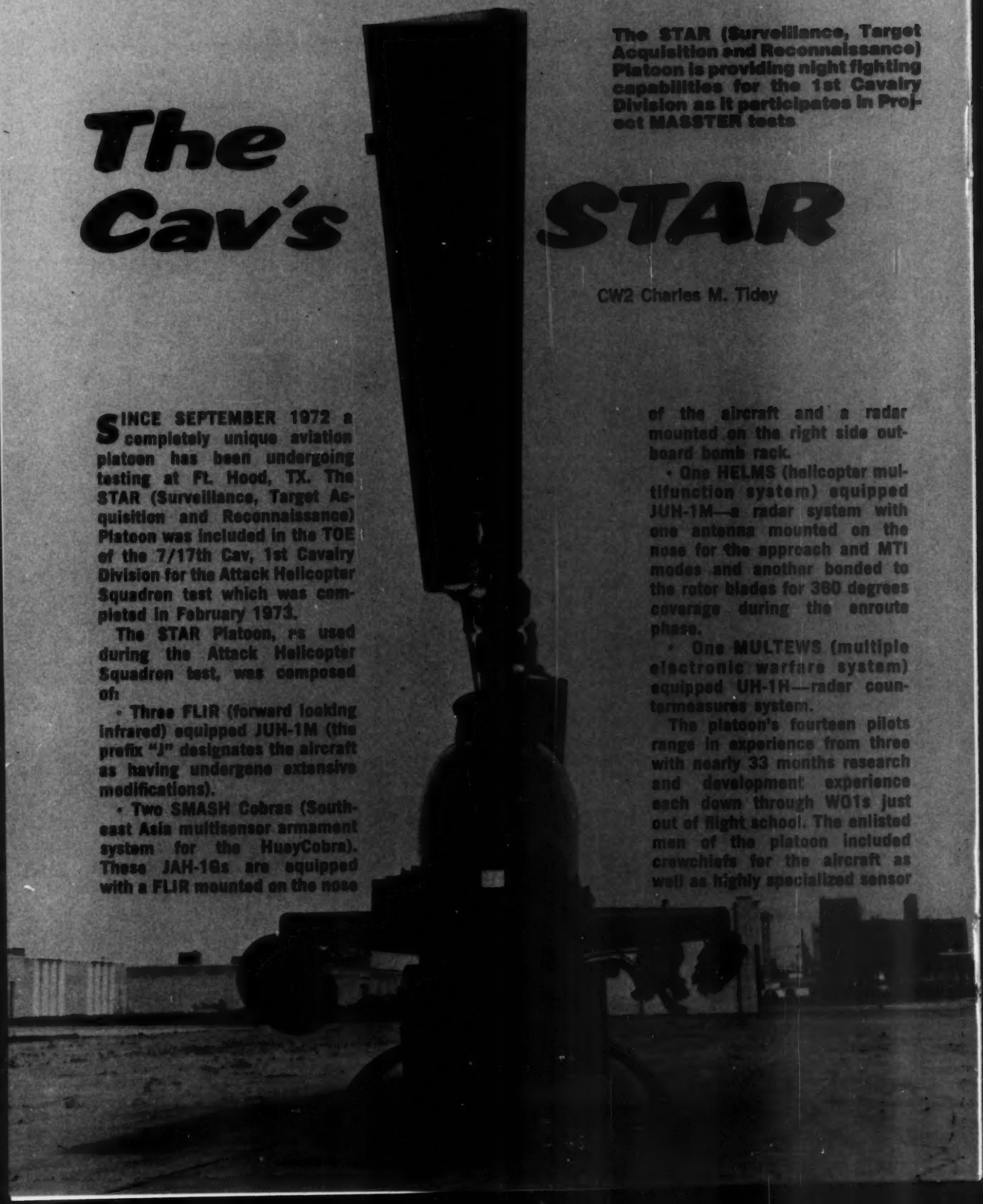
The tail boom and main rotor separated from the aircraft and the cockpit and cabin section sank into 10 feet of water, coming to rest on its left side.

continued on page 32

The Cav's STAR

The STAR (Surveillance, Target Acquisition and Reconnaissance) Platoon is providing night fighting capabilities for the 1st Cavalry Division as it participates in Project MASSTER tests

CW2 Charles M. Tidey

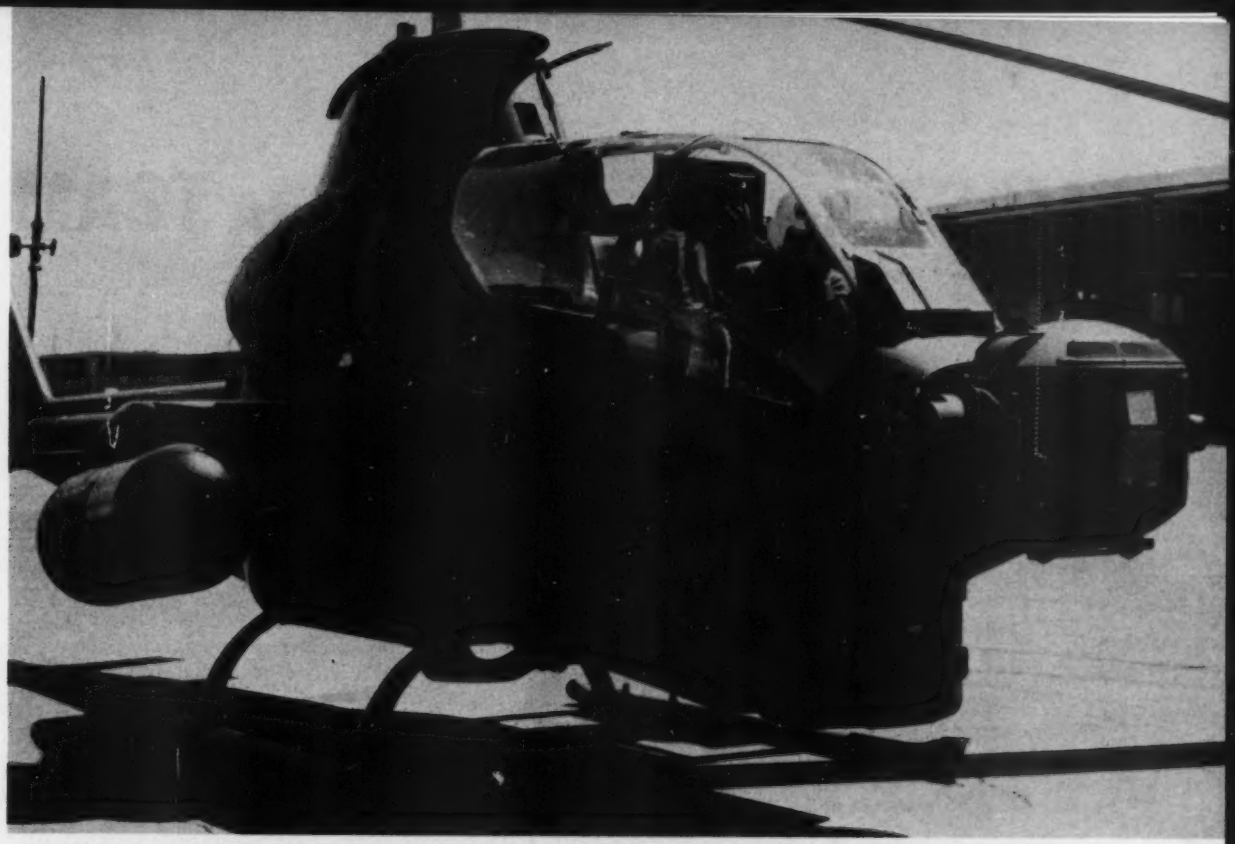


SINCE SEPTEMBER 1972 a completely unique aviation platoon has been undergoing testing at Ft. Hood, TX. The STAR (Surveillance, Target Acquisition and Reconnaissance) Platoon was included in the TOE of the 7/17th Cav, 1st Cavalry Division for the Attack Helicopter Squadron test which was completed in February 1973.

The STAR Platoon, as used during the Attack Helicopter Squadron test, was composed of:

- Three FLIR (forward looking infrared) equipped JUH-1M (the prefix "J" designates the aircraft as having undergone extensive modifications).
- Two SMASH Cobras (Southeast Asia multisensor armament system for the HueyCobra). These JAH-1Gs are equipped with a FLIR mounted on the nose of the aircraft and a radar mounted on the right side outboard bomb rack.
- One HELMS (helicopter multifunction system) equipped JUH-1M—a radar system with one antenna mounted on the nose for the approach and MTI modes and another bonded to the rotor blades for 360 degrees coverage during the enroute phase.
- One MULTEWS (multiple electronic warfare system) equipped UH-1H—radar countermeasures system.

The platoon's fourteen pilots range in experience from three with nearly 33 months research and development experience each down through WO1s just out of flight school. The enlisted men of the platoon included crewchiefs for the aircraft as well as highly specialized sensor



The SMASH-equipped HueyCobra combines a forward looking infrared (FLIR) sensor with a moving target indicator radar

repairmen for the FLIR and radar.

The platoon's mission as proposed and tested was to go out and reconnoiter the forward edge of the battle area (FEBA) for enemy movement during the hours of darkness. Even though some aircraft were originally equipped with armament systems (the FLIR and SMASH Cobras), their roles in this test were strictly as night scouts. The aircraft were operated at nap-of-the-earth even though it was night to avoid detection by enemy radar.

Once an enemy location was detected and this information relayed back to squadron headquarters, the squadron commander would launch an aerial counterattack either by direct assault with his Cobras armed with TOW missiles (simulated) or by an indirect assault with the insertion of the Rangers (who would be under his command) into an ambush site.

When the flight leader of the assault aircraft approached the FEBA, he would contact the STAR aircraft on station and receive an up-to-date briefing on the tactical situation. The STAR aircraft would then vector the assault aircraft into the target or into the proposed landing site if they are the troop insertion aircraft.

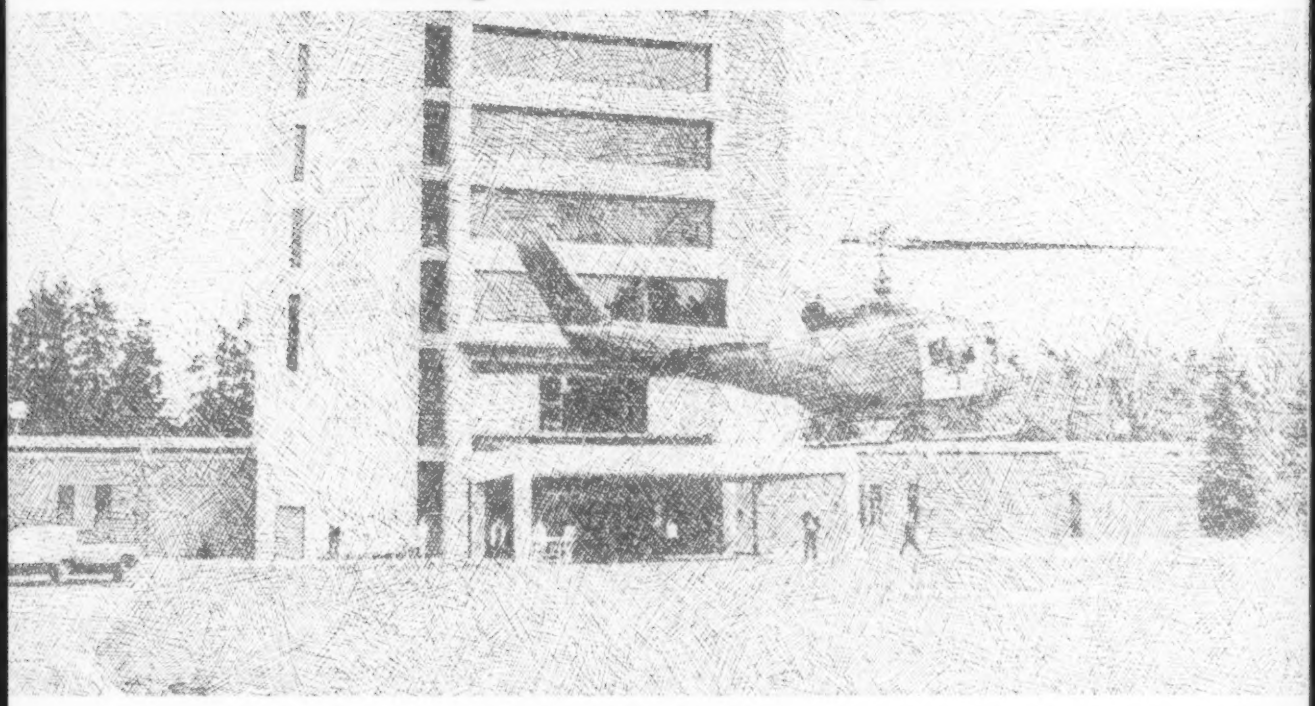
After this has been accomplished the STAR aircraft would remain on station to make damage assessments and then return to homebase for a debriefing.

Even though the Attack Helicopter Squadron test is completed (the results will be published later) the STAR Platoon is still an active element of the 7/17th Cav, awaiting more testing.

This unique and strictly one-of-a-kind platoon is representative of the new looks and tactics emerging in Army aviation.

The author was attending the Rotary Wing Instrument Course at the U. S. Army Aviation School, Ft. Rucker, AL, when he wrote this article. He was initially assigned to the SMASH Evaluation Team which was later enlarged to become the STAR Platoon. The author is on assignment in Korea

MAST Helps In Washington



"To keep him alive, for today and in the future"

OFTEN MAST helicopter rescue flights are quite routine and spark little news interest. But there's nothing routine when it's your little boy whose life is measured by a flickering heartbeat and the speed of whirling blades.

"What you did was a part of what has kept him alive for today and the future," the grateful mother of 22-month-old Eddy Armstrong said in a letter to the crewmen assigned to MAST (Military Assistance to Safety and Traffic) at Ft. Lewis, WA.

Eddy, whose home is in Yakima, WA, was burned over 35 percent of his body when boiling hot water from a vaporizer spilled over him last spring. He was rushed to Yakima Osteopathic Hospital where doctors fought for the next 2 days to save him, then realized that treatment facilities there were too limited.

Doctors said the best hope lay in transfer to a Seattle hospital, but that the time needed for the ambulance could be critical. MAST was called at its Yakima Firing Center base and a four-man crew—pilot, First Lieutenant Richard Lehman; crewchief, Specialist 5 Lewis Branson; and medics, Specialist 5 John Corwell and Sergeant William Peyketewa—responded quickly.

An ambulance and police escort met the rescue helicopter in Seattle and rushed Eddy to the hospital.

"Thank you ever so much," wrote Eddy's mother after he survived the pneumonia and his burns began to heal. She continued, "We came close to losing Eddy that night, but closer still the next night. As the doctors worked on him, with him very much conscious and with no relief from pain, it was discovered that he had internal bleeding, too. Then came pneumonia. Why Eddy did not give up we shall not know . . . now, Eddy is recovering fast. . . ."

It's a long road to recovery, but a MAST helicopter helped Eddy over one of the big bumps.

"You ARE appreciated," Mrs. Armstrong repeated in her letter to the Soldiers who had helped Eddy.

MAST At Fort Carson Aids Downed Skiers

Lieutenant Kevin H. Rorke

OUTSIDE THE HUT at Sun Spot, CO, a patrolman waited. In 2 hours, with darkness and the chill of night settling over the mountains, his long day on the mountain would be over. But when the telephone on the side of the hut started to ring, he reminded himself that accidents can happen any time of the day.

Picking up the phone he heard a voice at the main switchboard that told him all he needed to know—there was a "wreck" on Cramner above the road. Quickly the patrolman grabbed his toboggan and sped away down the mountain side.

The scene described above happened recently at one of Colorado's largest ski areas. Each weekend 10,000 skiers slide, fly, fall and tumble down its varied slopes.

When the patrolman reached the scene of the accident, or "wreck" as it is called in ski-patrolese, he discovered that the downed skier was a woman with obvious back and head injuries. She had somehow flipped over backwards and landed on her head and upper spine. She was having trouble breathing and had lost feeling in her lower extremities.

Because her injuries were so serious, more men were summoned to help transport her down to the main patrol house at the base lodge. The area's physician on call verified that the woman was indeed having neurological problems. She needed immediate evacuation to Denver. Any delay might result in permanent paralysis.

The doctor determined that transport by ground ambulance would take over 2½ hours—too slow for the type of injury involved. Consequently, a MAST helicopter from Ft. Carson, CO, was requested for the job. The helicopter arrived within 40 minutes and 20 minutes later the woman was being wheeled into Denver General Hospital. A crucial 1½ hours had been saved because of the MAST (Military Assistance to Safety and Traffic) unit stationed at the Ft. Carson hospital.

MAST was the brainchild of the Departments of Defense (DOD), Health, Education and Welfare (DHEW) and Transportation (DOT) (see page 11).

To test the MAST concept, temporary helicopter sites were chosen at various military sites. Ft. Carson was lucky enough to have been one of those chosen and organized a MAST program in 1970. By March 1971 the 78th (now the 571st) Medical Detachment was activated to assume the MAST mission at Ft. Carson.

Employing speed, medical skill and concern, the 571st Medical Detachment has gone far beyond the limits and anticipations of the original MAST concept. As indicated by the ski accident, MAST has come to play a major role in all aspects of medical and air evacuation to include ski accidents, mountain climbing accidents, seriously ill patients and many more.

Speed, of course, is the main advantage a helicopter has over a ground ambulance. But as many patients have found out, that is not the only advantage its crews offer an accident victim. Each patient receives skilled inflight medical care.

Most of the 571st's medics are line medics or Dustoff veterans of the Republic of Vietnam. They have all received extensive emergency medical training and have treated every imaginable traumatic injury.

All of the MAST medics have a

MAST helicopters are quite useful and save time in evacuating patients

thorough working knowledge of basic first-aid principles, from splinting broken bones and initiating artificial respiration to controlling bleeding.

In addition, the 571st's medics are highly proficient in performing more complicated procedures such as starting intravenous fluids, closed heart massage and suction for internal chest injuries.

Along with speed and extensive medical training and experience, the MAST unit at Ft. Carson possesses an intangible quality that makes everything jell. That intangible is concern. Every pilot, medic and crewchief of the 571st is genuinely concerned with his mission and the performance of his duties.

For example, take the skiing accident mentioned above. One of the volunteer ski patrolmen who helped the injured woman was First Lieutenant Alan Perry of Ft. Carson. He said, "From the moment the helicopter touched down it was obvious from the crewmen's attitudes that they were not simply running a taxi service. Those men were really concerned with the woman's condition. When they left we were all certain that the lady would be receiving the best possible inflight care."

Another incident which graphically indicates the lengths to which the 571st will go to ensure a patient's welfare occurred when several members of a mountain climbing party were caught in a landslide. Six of the climbers sustained injuries that rendered them unable to descend the mountain. One of the uninjured made his way to a ranger station and called for assistance. MAST was asked to fly the rescue mission.

When the MAST helicopter, flown by CW2 David Borrell and First Lieutenant Randy Cockrum, arrived at the accident, the crew immediately evacuated three of the injured climbers. Two of the crewmembers, Specialist 5 Gene Chroneister and Specialist 4 Dennis Barrett, were left to help bring the other injured climbers down to a landing zone. The climbers were trapped on an inaccessible ledge 1,000 feet above the zone.

Night was beginning to fall when the pilots returned for the remaining patients. Because of the difficulty in landing on the mountain side, there would be no other pickup after dark. Weight and space limitations dictated that someone would have to stay and spend the night on the mountain. That night Specialists Barrett and Chroneister and a guide used the camping gear the climbers left behind and spent a very cold night on a mountain. They were simply reflecting a rule of the unit: *patient care first.*

Whether an injury is caused in a landslide, a skiing fall or an automobile accident, the various state services and medical facilities know that MAST will respond when called. But the public's support and trust did not come automatically.

When MAST first began at Ft. Carson, a great deal of emphasis was placed on public awareness. Consequently, the 571st set up the MAST education mission designed to inform the public of MAST's capabilities and requirements.

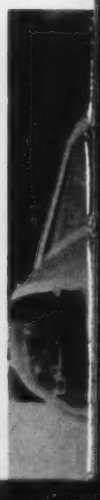
A crew from the 571st would fly to a town and speak with responsible representatives from the town's medical facilities, police department, chamber of commerce and city government. Members of the 571st would explain what MAST could do to help save people's lives. They would tell them the information needed when a call for assistance was placed. They also would give instruction on the proper way to approach a helicopter and the types of landing zones needed.

The instruction on landing zones must have been especially impressive. The hospitals at Salida, Leadville and Hugo built landing areas especially for MAST. Several Denver hospitals—St. Luke, St. Anthony and Denver General—also have built roof-top landing pads.

From the standpoint of public

MAST "copter" arrives at accident site

Medics administer first aid



education and awareness, perhaps nothing was as instructive as MAST 111. This mission brought MAST's capabilities into clear, sharp focus and received national recognition.

MAST 111 involved 15 injured people. On 11 September 1971 a school bus carrying the Gunnison High School junior varsity football team started down the east side of the 11,312-foot Monarch Pass. The team was going to Salida to play a game. Simultaneously and without warning the bus lost its shifting capabilities and its brakes. The coach and the driver frantically tried to apply the emergency brake as the bus gained speed and flashed down the mountain. Their efforts were futile.

The driver tried to avoid both downhill and oncoming traffic while negotiating curves at 50 miles per hour. However, the bus eventually went out of control, rolled over three times and ended up overturned in a gas station parking lot.

Four of the 40 passengers died immediately. Two more died before medical assistance reached the scene and three of the players died enroute to Denver. MAST was called, and before the day was over, the 571st made five trips and carried 15 patients to St. Luke's Hospital in Denver.

Captain Jack Breckenridge, a physician at Ft. Carson's hospital, flew one of the MAST runs to pick up five seriously injured players who had been taken by ground ambulance to the Salida hospital. "The confusion and mass of people at the hospital was incredible. Salida just wasn't equipped to handle that many injuries at one time," said Captain Breckenridge.

Authorities agree that without the fast response of the MAST unit and Ft. Carson's physicians, many other players might have died before they reached Denver.

Although a mass casualty situation receives a great deal of publicity and taxes the unit's know-how, for many men in the 571st their greatest job satisfaction lies in a different area. That is when they are able to help save the life of a premature baby. CW2 Peter Ward, for instance, said that the most rewarding mission he has had since he has been a MAST pilot is the mission he flew to Aspen to transfer a premature baby to the Denver Children's Hospital.

"The weather was bad," he said, "but I was able to make it in and pick up the baby. There was just something about that mission that made me feel good."

Captain McCrary summed up his feelings in a different way. "Premature babies are so totally dependent on you. It's not like helping a rational adult who is supposedly self-sufficient and able to take care of himself. The 'premie' depends so much on the people taking care of it, that perhaps is why that extra effort is put forth in trying to save its life. For sure there is extra satisfaction when the mission is a success."

Whether they are transporting premature babies, aiding in a mass casualty situation or helping an injured skier, the MAST unit at Ft. Carson is ready to fly. But what about the public's reaction to the military stepping into the realm of the civilian? A look at the letters of appreciation the 571st has received provides the answer to that question.

For example, take the letter written by the parents of a premature baby after the 571st helped transport the baby to a Denver hospital. They said, "Without this fast, efficient service our little girl would probably not have lived."

Or the letter from a husband who wrote when MAST helped his wife who had been seriously injured in an auto accident. "I know this speedy evacuation certainly saved her life," he said.

And finally, a letter thanking the 571st after they helped transfer a wife's critically ill husband to a Pueblo hospital which read, "In times like these, it is refreshing and revitalizing to know that the military can always be counted on. . . ."

Patient is loaded aboard MAST helicopter

Onboard patient care

When Vickie Barker, Tenino, WA, was injured in a horseback accident in March it was only a 12-minute flight by MAST aerial ambulance to St. Peter Hospital, Olympia, WA. Photographs by Olympian photographer Del Ogden

Vickie is transferred

Medic Larry Shepard gives aid as stretcher rolls

Patient is rushed through the emergency entrance

MAST IS

...the acronym for Military Assistance to Safety and Traffic.

...the use of military helicopters and service medical personnel to assist during civilian medical emergencies.

...paramedical personnel putting their medical know-how into practice.

...a suggestion by the Secretary of Defense in August 1969 that an Interagency Planning Group be established to consider a proposal to use military resources to respond to highway accidents.

William H. Smith

Staff Writer

IN DECEMBER 1969 the first meeting of the MAST Interagency Study Group was held in Washington, DC. It was agreed to analyze legal aspects; federal, state and local relationships; command, control and communications considerations; and funding of the MAST project.

By February 1970 the study group had determined, on paper at least, that the benefits to be gained by establishing the MAST program seemed to outweigh the objections. It was therefore decided to test the concept with a pilot program. Test sites were to be where the military already had the proper aviation capabilities; the local governments and populace were willing to cooperate; rural areas were near adequate medical facilities; and where there were enough various climates and terrain conditions needed for the test.

Various potential sites were visited. At each the MAST concept was presented to local medical, public safety and political leaders. As a result three Army posts and two Air Force bases were selected. Operations were started at Ft. Sam Houston (San Antonio), TX, by the 507th Medical Company (AA) in July 1970 and a month later at Ft. Carson, CO, by the 4th Infantry Division. [Today MAST missions are flown at Ft. Carson by the 78th (redesignated the 571st) Medical Detachment and at Ft. Lewis, WA, by the 54th Medical Detachment (Helicopter Ambulance).] These units use UH-1H helicopters. Operations got underway in September 1970 at Mountain Home Air Force Base, ID, and Luke Air Force Base, AZ, by the 42d Air Rescue and Recovery Squadron with HH-43 helicopters.

At the test sites programs were developed by the civilian community working with the military. Helicopters were to augment local emergency medical services, not replace any elements of them. MAST operations also were not to be used in areas where ground ambulances would be more responsive. Requests for helicopters were to be made by medical or public safety officials on the basis that a patient's condition was seri-

Figure 1

MAST Operating Data
15 Jul 70–31 Dec 70

Site	Months of Experience	Number Missions	Hours Flown	Patients Evacuated				
				Highway Casualties	Other Med[1] Emergencies	Total	Number[2] Critical	Number Non-Critical
FORT SAM HOUSTON, TX	5½	114	141.4	86	52	138	82	56
FORT CARSON, CO	5	25	87	15	30	45	22	23
FORT LEWIS, WA	5	34	41	14	30	44	19	25
LUKE AFB, AZ	4	5	13.2	3	15	18	5	13
MOUNTAIN HOME AFB, ID	4	4	7.5	0	4	4	3	1
TOTAL		182	290.1	118	131	249	131	118

1–Includes heart attacks, gunshot wounds, accidental injuries, illness, premature infants, burns, etc.
2–Patients admitted to hospitals in critical or serious condition, as recorded in admission reports

ous or life-threatening and required expeditious transport to a medical facility.

There was a wide variation in the number of missions at the five MAST sites (figure 1). The disparity was probably due to the length of time the sites were in operation; the number, distribution and urban/rural configuration of the population; the number and capability of the emergency medical facilities; and the closeness of the relationship between the military and the local communities.

The limited number of helicopters available at the Air Force sites and the nature of their primary mission partially explains their relatively low number of missions. With the equipment and personnel available they were not able to maintain an "around-the-clock" immediate response capability.

The Washington and Colorado operations were not located near large population centers nor centers of emergency medical service. This is probably the main reason they flew fewer missions. Weather conditions caused some aborted missions and the loss of a helicopter in one area may have been another factor. However, a definite cause for the lower utilization at these sites has not been established.

Many factors seem to have contributed to the success at San Antonio. There was a large metropolitan area nearby; a full-scale aeromedical unit to conduct the operation; good command level support; effective local planning and organization; favorable terrain and weather conditions; and an unusually high degree of activity and favorable publicity. In addition, San Antonio had an unusually large number of hospitals with helipads. The other four sites had an average of 4½ to San Antonio's 18 (figure 2).

From a purely military point of view the test showed that a MAST program could be conducted without additional funds and personnel and did not require additional flying time. It also emphasized the desirable training and motivation it afforded medical personnel.

The test also revealed that Army units particularly well suited for supporting civilian medical emergencies are the Medical Air Ambulance Company and the Medical Air Ambulance Detachment. These units are self-supporting enough to be stationed independently of a larger parent unit. They could accept a MAST assignment with little or no disruption to normal peacetime schedules and training and are organized and equipped to fly MAST missions. It was learned that Army air tactical units also can be used, but to be effective they must divert personnel from normal training activities. In ad-

Figure 2

Mast Operating Experience

15 Jul 70–31 Dec 70

Data Elements	San Antonio, Texas 15 Jul 70	Colorado Springs, Colorado 6 Aug 70	West Central, Washington 6 Aug 70	Mountain Home, Idaho 1 Sep 70	Phoenix, Arizona 1 Sep 70	Totals
MISSIONS						
Total Number	114	25	34	4	5	182
Day	56	20	21	3	3	103
Night	58	5	13	1	2	79
Average time per mission	1 hr 12 min	3 hrs 30 min	1 hr 12 min	1 hr 54 min	2 hrs 39 min	
Average time to lift off	2 min	20 min	6 min	48 min	30 min	
Average time to pickup site	27 min	52 min	29 min	1 hr 6 min	30 min	
Average time from pickup to hospital	24 min	1 hr 11 min	25 min	36 min	30 min	
Average distance to pickup site	48 mi	62 mi	38 mi	62 mi	30 mi	
Aborted missions	6	2	3	6	0	17
Weather	0	0	2	0	0	2
Other	6	2	1	6	0	15
HOURS FLOWN						
Total number	141.4	87	41	7.5	13.2	290.1
Day	66.4	70	24	4.2	6.6	171.2
Night	75	17	17	3.3	6.6	118.9
PATIENTS						
Total Number	138	45	44	4	18	249
Day	57	37	25	3	6	128
Night	81	8	19	1	12	121
Critical	82	22	19	3	5	131
Non-critical	56	23	25	1	13	118
Dead on arrival	4	0	1	0	0	5
Died after admission	2	4	1	0	1	8
Type of Patients						
Highway accident	86	15	14	0	3	118
Inter-hospital transfer	111	20	0	0	0	131
Premature infant	4	5	2	0	0	11
Hoist	1	0	0	1	3	5
Other	52	5	30	4	15	106
Hospitals with helipads	18	4	5	4	5	36

Figure 3

MAST Missions Report

Site	Period (26 Feb 73–4 Mar 73) Missions	Patients	Hours	Totals to 7 Oct 73 Missions	Patients	Hours
FORT CARSON, CO (6 Aug 70)	1	1	4.0	477	597	1688.1
FORT LEWIS, WA (6 Aug 70)	9	9	18.6	728	766	1282.8
FORT SAM HOUSTON, TX (15 Jul 70)	3	3	4.6	995	1118	1494.2
LUKE AFB, AZ (1 Sep 70)	0	0	0.0	*82	113	178.4
MOUNTAIN HOME AFB, ID (1 Sep 70)	0	0	0.0	47	52	97.2
TOTALS	13	13	27.2	2329	2646	4740.7

All missions were patient transportation

*Luke AFB, AZ, deactivated 31 March 1973

dition, it might be necessary to give these units special medical training and augment them with aircraft and personnel.

The study group concluded that the concept is operationally feasible and aeromedical evacuation procedures developed for combat can be used in civilian emergencies. It also concluded that to be effective the air unit must be able to maintain a full-time capability and that the local civilian emergency medical system must be highly developed and well-organized.

When the MAST pilot program was nearing completion civilians living in the test areas showed how successful they thought the program had been. At all sites they made strong appeals for continuation of the program. Their wishes were granted and MAST is operating in these areas today. By 7 October 1973 the five sites had flown 2,329 missions, assisted 2,646 persons and logged 4,740.7 flying hours (figure 3).

President Richard M. Nixon pointed out in 1971 that there was an appalling and needless loss of life in the United States due to grossly inadequate emergency medical care systems. In his message to Congress in February 1971 the President said, "For some Americans—especially those who live in remote rural areas [medical] care is simply not available. . . . I'm calling today not only for new programs and not merely for more money, but for something more—for a new approach which is equal to the complexity of our challenges."

The President was referring, in part, to statistics showing that 70 percent of motor vehicle accidents occur in rural areas in communities of less than 2,500 people. The statistics also reveal that people involved in rural accidents stand a greater chance of dying at the scene of the accident or dying sooner after injury—and of lesser injuries—than those hurt in urban areas. This is simply because victims in rural areas can't get emergency care as fast.

By 1968 accidental injury in the United States became the leading cause of death in the first half of the lifespan of Americans. In 1965 about 52 million accidental injuries resulted in 107,000 deaths; 400,000 permanently disabled; and more than 10 million temporarily disabled. Of the deaths 49,000 were by motor vehicle accidents, still the leading cause of death in the 1-to-37-year age group and the fourth leading cause among all age groups less than 75 years. By 1968 the number of motor vehicle accident deaths had reached 55,000.

In most accident situations the greatest danger to an injured individual is shock and/or loss of blood. The delay between the time of injury and when an individual receives first aid or specific medical treatment often determines whether or not the person survives. Thus, there is a need for responsive and fast-moving ambulance and rescue service capable of delivering immediate aid and supportive care during transport. This can often be furnished by ground ambulance service but at other times the already tested and proven MAST system is the answer.

When the Secretary of Defense, in a memorandum dated 13 May 1972, approved the continuation of MAST operations at the five existing sites, he authorized *planning* activities in 18 additional geographic areas, pending Congressional approval. Implementation of the new operational sites must therefore wait until appropriate legislation is enacted by Congress. A bill authorizing the Department of Defense to provide civilian medical emergency transportation was introduced in the House of Representatives on 4 January 1973. A similar bill was introduced in the Senate on 15 January 1973.

As a consequence of the Secretary of Defense's memorandum, plans have gone ahead for establishing MAST operations at 18 additional locations. The MAST Interagency Coordinating Committee, comprised of representatives of the Departments of Defense; Transportation; and Health, Education, and Welfare, have been visiting those communities that have requested MAST assistance . . . outlining specific procedures

and defining criteria for implementing operations. Areas interested in MAST are appointing civilian coordinators, coordinating committees and fund-raising committees, usually from among individuals representing local emergency medical services (EMS).

As at the test sites, the new MAST systems will supplement the present emergency medical services with military air ambulances, crewmembers, medical equipment and supplies. Their presence will neither be a substitute for, nor deter community investment in, emergency medical service. Helicopters will be used in serious cases where ground ambulances are not practical, roads are bad, traffic heavy, distances long and when the patient needs special transportation. For MAST purposes a serious emergency is defined as a situation where an individual's condition requires that he be air-evacuated to a medical center as soon as possible to prevent his death or the aggravation of his illness or injury.

MAST units may respond to serious gunshot wounds, heart attacks, farm accidents and similar emergencies when the situation warrants it. They will transfer patients among hospitals and also are available to pick up and deliver blood, medicine and human organs for transplant operations.

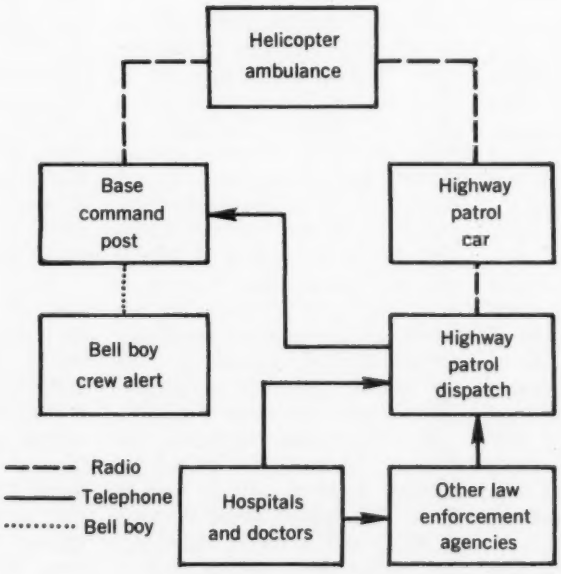
Communications are the heart of MAST and could be one of the biggest problems it encounters while being established around the country. Systems available on Army helicopters cannot provide common links with civilian authorities, police or medical facilities involved with MAST.

Except at Luke AFB, none of the pilot MAST communities attempted to set up a comprehensive communications network (figure 4). Air ambulances were usually restricted to talking with their own base and the police vehicle at the scene of the accident. Communications between the police and the helicopters were made possible by installing police or civil defense radios in the aircraft that did not require modification of the aircraft. Funding for the communications network is the responsibility of the civilian communities. Some areas plan on using funds from their state highway safety programs for this purpose.

Figure 4

Communications Network

Luke Air Force Base



Ideally, the communications network would have a simple means to call for emergency assistance. In most cases the requester would be a law enforcement officer, someone connected with the emergency medical service or a civilian authority.

A call for help normally is sent through a hospital, a highway patrolman, county sheriff or civil defense director. All requests for MAST flights are funneled through a central regulating agency (CRA) which is usually a hospital. There may be only one or several scattered throughout the area, according to the need.

The requester furnishes the CRA with as much information as possible to help the helicopter make the pickup. This includes the location of the pickup, weather, obstacles to landing, pickup area markings, number of patients, type of injuries, special equipment needed and whether a hoist is needed. If he is a policeman or some other official with a radio, he gives his frequency and call sign.

When the CRA determines that a request is valid, the request is transmitted to the MAST unit. The CRA also designates and subsequently notifies the receiving hospital of the pending arrival of the patient and provides the known information concerning the patient's condition. The official initiating the request is responsible for coordinating with police, the sheriff or

MAST crew unloads a premature baby at the Santa Rosa Medical Center

other officials in the area of the pickup. These officials assume the responsibility of directing the helicopter to a safe landing. They give the pilot their estimate of the wind direction and speed, any hazards to flight, a description and size of the landing area, markings used to identify the landing area and the type of lighting for night operations.

The test MAST program showed that the UH-1H can operate within a radius of 100 nautical miles without refueling and is an excellent helicopter for the project. The minimum crew required for an air ambulance mission can be just a pilot and medical attendant, but the UH-1Hs will probably carry the normal crew of an aircraft commander, pilot, medical attendant and crewchief.

The aircraft commander is responsible for the helicopter and ensures that he can accept the mission. He makes sure he has the information needed for the flight. When possible, he maintains communications with the CRA, personnel at the pickup site and his destination. He is responsible for leading patients and their care enroute to the hospital. He is the final authority as to whether or not the mission can be flown because of weather restrictions.

The medical airman coordinates the loading and unloading of patients, passengers and equipment. He furnishes care and treatment for all patients onboard the aircraft and keeps the aircraft commander advised of their conditions. He ensures that all medical supplies are onboard the aircraft and in usable condition, helps the crewchief install the hoist when required, and also helps the crewchief perform a daily inspection and clean the helicopter.

The medical equipment onboard the helicopter consists of blankets, oxygen, pressure bandages, airways, I. V. fluids, tourniquets, wire splints, pneumatic splints, resuscitator and assorted bandages. Special equipment required for individual patients is furnished by the civilian hospital and is picked up when the helicopter is enroute to the pickup site.

Experience proves that to be effective MAST must be available 24 hours daily. Also, it has been established that missions occur about one mission per day per million population. The number of helicopters required to be on call varies according to the number of missions expected. Usually only two completely operational helicopters are needed in each MAST area. A third backup helicopter is desirable in case mechanical difficulties develop in a helicopter on call. The primary duty helicopter is preflighted, completely runup and mission ready with at least 1,000 pounds of fuel at all times.

Each MAST helicopter has two four-man crews on duty for every 24 hours. One crew is on immediate call; the other is on standby, but assists the primary in the event of mass casualty situations or responds to missions when the primary crew is committed. Every 6 hours the crews alternate.

When the call for a MAST mission comes through on the "hotline" or radio, whichever the case may be, the primary crew "scrambles" to the helicopter and prepares to depart. While the copilot readies and starts the aircraft, the aircraft commander receives information concerning the mission. When sufficient information is obtained, he departs enroute to the pickup site. When they bring their patient into the hospital helipad the members of the crew experience the wonderful feeling associated with helping your fellow man . . . and they know that—

MAST is a way the Army is helping to do something to help reduce the mounting highway accident death toll.

Cobra Escape System

For increased survivability

Robert A. Matthews, DAC

"WHISKEY Tower, this is Statler leader, airborne with two chicks, for mission run at Yellow Base 4."

With this rather routine radio chatter, three AH-1G HueyCobra helicopters lifted off from the ready pad of a forward base somewhere in the Republic of Vietnam (RVN). The mission was close air support for a South Vietnamese infantry unit. Each aircraft was armed with XM-159 rocket pods and a complement of 7.62 mm ammunition.

As the support flight progressed to the target area about 30 air miles away Whiskey Base Combat Information Center (CIC) was monitoring the flight. A short time later Cobra flight leader rogered that they were over the target area and acknowledged radio contact with Yellow Base 4 leader, who directed where they wanted the airborne support fire.

Later Statler leader acknowledged he was commencing the run. Whiskey base CIC next heard from Cobra flight leader, "Whiskey Tower—Statler 2, has been hit and is going in!"

With that rather excited and often heard radio chatter an AH-1G with its crew was lost. The ill-fated Cobra had slammed into the ground, killing both crewmembers instantly. Although this example is fictitious, the chronology of events ending in the loss of an AH-1G and its crew was all too familiar in RVN and elsewhere and can be reduced in the future.

From 1967 through 1970 about

Mr. Matthews is a project engineer at the U. S. Army Aviation Systems Command on the development of the aerial recovery kit and inflight escape system for the Army's attack helicopter

200 crewmen (AH-1G) were lost in combat, training missions or due to maintenance problems. During early 1970 the Naval Weapons Laboratory at Dahlgren, VA, began feasibility testing of an off-the-shelf escape system, that is currently installed on the A-1 and T-28 aircraft. Early feasibility tests by the U. S. Navy demonstrated that incorporation of a similar system, coupled with development of appropriate linear shaped charges (LSC) to blow the rotor blades and open the canopy, offered a possible system that might work on the AH-1G/J.

The Department of the Army became interested in the results of these early Navy tests in late 1971. Through a series of working meetings personnel from the Naval Weapons Command, the Naval Air System Command and the U. S. Army Aviation Systems Command developed data necessary for perfection of the criteria for an escape system for the AH-1 helicopter. This working group was later expanded to include personnel from the Army's Test and Evaluation Command, Combat Developments Command, Life Support and Natick Labs, each of which cooperated to hammer out an Army draft materiel need document. This document was subsequently converted into the required operational capability format and was submitted by the then Combat Developments Command Aviation Agency at Ft. Rucker, AL, to Headquarters, Combat Developments Command, Ft. Belvoir, VA, for staffing and eventual approval by the Department of the Army.

The Army's funding for this joint Army/Navy program was approved with overall development expected to be completed in 27 months. Critical evaluation of current off-the-shelf components of a rocket extraction system indicates that their size and weight need to be reduced to allow integration into the current AH-1G/J cockpit. Further emphasis on such a system is noted with the eventual fielding of the Army's AH-1Q TOW Cobra and its mission profile of nap-of-the-earth maneuvering prior to target acquisition.

Major emphasis of the joint Army/Navy development project will concentrate on perfection of a high energy, lightweight tractor rocket, multiple sequencing device for blowing main rotor blades, engine shutdown and canopy removal prior to egress of pilot and gunner. A major problem in this area is determining a minimal "safe" ejection envelope for 100 percent successful extraction.

One of the many problems associated with the escape envelope is the reaction of the AH-1 helicopter body once the rotor blades have been severed. Early computer run-out by the Bell Helicopter Company indicates a tendency for the Cobra to yaw over and pitch up.

During the Navy's early feasibility tests, investigation of other means of safely extracting Cobra crewmembers ruled out methods such as using LSC to blow the floor area out and ejecting crewmen downward, or removing the side of the aircraft by LSC and extracting crewmembers out the side because of the need for a larger LSC change and the weight constraints for such a system. Other problems associated with the joint development program concern the trajectory of the severed rotor blades as a possible threat to other escorting AH-1 aircraft in the area. This problem has been investigated by the Navy and will be part of the joint development effort. Sequential severance of the main rotor blades (which has been demonstrated earlier by the Navy in consort with Sikorsky Aircraft) will be considered as a means of reducing the hazard of the severed rotor blades to other escort aircraft.

Early development of a workable escape system will be done jointly by Navy and Army agencies. Design and development of the LSC will be handled by the Naval Weapons Labs, Dahlgren, VA, and Frankford Arsenal, Philadelphia, PA. Modification of a current harness and parachute system will be conducted by the Army's Natick Labs and the Naval Air Recovery Facility at El Centro, CA. Overall engineering responsibility will be handled by the Naval Air Development Center, Warminister, PA, and the U. S. Army Aviation Systems Command, St. Louis, MO.

Ground-bound troops (below left) of the 25th Infantry Division participate in an assault on a mountain village during the Korean War. In order to get from their position to the area of conflict they had to move over the rough terrain on foot. Today, the helicopter has greatly increased the soldiers' mobility as pictured by Private Don Dorman when the 2d Infantry Division conducted airmobile maneuvers recently

Airmobility In Korea

Lieutenant Charles E. McNamara

2d Infantry Division
Public Information Office

IN A BLAZING 8-minute display of helicopter formation flying at low levels, Cobra stealth and Chinook power, 2d Infantry Division units showed their airmobile prowess recently near Camp Casey, Korea.

The airmobile exercise reflected how American forces are concentrating on airmobile tactics suited to fighting on the tops of Korea's mountains. It was witnessed by General Richard G. Stillwell, new 8th Army Commander, and Lieutenant General Richard T. Knowles, the deputy commander.

After the AH-1G HueyCobra preparation, and an escort by 13 of the big-toothed "Snakes," three rifle companies from the 1st Battalion, 31st Infantry, and five 105 mm howitzers from B Battery, 2d Battalion, 17th Artillery, were inserted on a hilltop by 24 UH-1 Huey troop transport helicopters and six CH-47 Chinook cargo helicopters.

A total of 46 aircraft, including two observation ships, were used in the exercise. This is believed to be one of the largest airmobile exercises ever conducted in Korea, according to aviation officials.

In the exercises, the entourage of helicopters began sneaking along the Imjin River at such a low level that they were unseen until they turned toward their objective and started up the narrow valleys. The entire simulated attack, termed "a tactical surprise," took only 8 minutes to complete. Under conditions that existed during the Korean War, it would have taken hours and sometimes even days for the same group of soldiers to make a similar assault. In addition, they would have arrived tired and without the fire cover and element of surprise offered by the helicopters.

Helicopter support was provided by A Company, 2d Aviation Battalion; D Troop, 4th Squadron, 7th Cavalry; 52d Aviation Battalion; and the 213th Aviation Company.

Aeromedic

MOST PROFESSIONAL aviators will promptly admit the incompatibility between drinking and flying. In spite of the whimsical attitude expressed by the "no drinking within 50 feet of the aircraft" refrain, they wouldn't seriously consider flying off into the Green Machine's wild blue in the intimate company of ole "Ethyl."

With our increasing knowledge of the human body's metabolism of ethyl alcohol, it becomes more and more apparent that the effects of alcohol prevail long after the last drink. This may be of little concern to the social drinker headed to a desk job the morning after. Flying, however, demands the coordination of many finely balanced body systems to produce integrated and precise control movements under the influence of a mature and unclouded cerebral cortex. As the accompanying article reveals, this may not be possible the morning after, when significant amounts of alcohol are still circulating in the blood stream. In addition, the metabolic and fluid imbalances that are commonly reflected in that "hungover" feeling reflect the compromise that one's body must make with alcoholic beverages.

Certainly, then, the professional aviator needs to think twice about his liquid sociability in proximity to flying missions. Army Regulation 40-8, entitled "Temporary Restrictions Due To Exogenous Factors," says: "Individuals receiving the following... will be restricted from flying duties as indicated: Alcohol—12 hours after the last drink consumed and until no residual effects remain."

Take that as your bottle to throttle time as a minimum. Give your ole Fright Scourgeon credit for knowing a little bit about what's going on under your skin. Believe it... he's not a prohibitionist at heart!

NICHOLAS E. BARRECA, M.D.
LTC, MC, SFS
Dep Dir, OAET

Provided by the Society of U. S. Army Flight Surgeons

Reprinted from AIRSCOOP

A Look At Drinking And Pilot Performance

Lieutenant Colonel Alfred B. Watson Jr.

Chief, Aerospace Medicine Division
HQ, USAFE

OVER THE PAST year USAFE has been active in the identification and treatment of alcohol abuse, and in educating itself in the ill effects of intemperate use of alcohol. For the alcoholic, this has been a turn-around in our attitudes and management toward him. No longer are we saying, "Old Charley's a good guy when he's sober, but he's drunk all the time,"—and carrying him; and conversely, no longer are we saying, "He's a drunk, drum him out without pity!"—and firing him; we are encouraging Charley and his supervisor to admit the problem and work on its solution. And we're making progress; as evidenced by the rehabilitation of some fine people who had fallen far into the bottle.

In our efforts to get these people to treatment we've also been working on another health and safety dilemma—the "Who, me?" group whose drinking patterns are "not out of control." In our USAFE planning sessions we've discussed this under the heading of deglamorizing drinking. Contrary to a widely held view, this is not addressed at any moral stance in favor of teetotalism—even though it is clear that no man will drink a bottle if he doesn't take the first drink.

On the contrary, there are some hardnosed reasons for the "Who, me?" crowd to know about and control their drinking patterns. Evidence is available, for example, that 10-35 percent of the pilots killed in private aviation accidents in the United States had measurable quantities of ethyl alcohol in their blood at the time of death. Alcohol is an element in more than one-fifth of all private motor vehicle accidents in USAFE. Insurance companies, wise to this numbers game, will write money-saving policies on the guy who doesn't drink.

A recent FAA-sponsored study is pertinent to the subject, encouraging the paraphrase of an old saw, to wit: "There are drinking pilots and thinking pilots, but there are no thinking, drinking pilots!" The study took two series of pilots —experienced (average 9,500 flying hours, 1.125 instrument hours) and inexperienced (550 total, 75 instrument), and set them in a Cessna 172 on simulated night

instrument missions. The Cessna was considered by the test designers as "perhaps the simplest, most forgiving airplane in the general aviation fleet"—certainly tamer than the USAFE fleet. The pilots' task was to fly ILS [instrument landing system] approaches, two to instrument minimums and missed approach procedures, and two to landings. They did it sober and then drunk—after enough vodka and orange juice to produce blood alcohol levels of .04, .08 and .12 percent. Both sets did well sober. As their blood alcohol rose, their error rate did, too. At .12 percent safety pilots had to take control of the airplane more than half the time (16 times in 30 flights). The percentage frequency of major and catastrophic errors is shown in the accompanying figures.

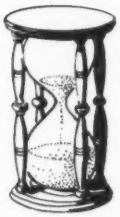
These figures are even more impressive when you know that experienced pilots could keep the airplane on the glide path, even at high alcohol levels—that is, their primary task was still going reasonably well (and hence their sense of well being) while their attention was narrowing and their channel capacity for secondary tasks was being overloaded. So the "Who, me?" guy can slide down the pipe without realizing he's doing it.

"Well, now, come on, Doc, nobody feeds me screwdrivers on the way to the flight line." Is that what you said? That's not the way it works out. Let's do a little modern math. Suppose you drink sometimes before flight. How high your blood alcohol goes is a varying function of how much alcohol you drink and how much you weigh. You can bug the figures a little by what you mix it with, how fast you quaff, and what you've eaten before—but only a little. The alcohol—whether it's beer, wine, gin or 'shine—has to go through your blood stream, and is discarded at a practically constant rate (your favorite cures notwithstanding). To figure out how high your blood alcohol will go, calculate from this easy checklist formula:

$$\text{Highest blood alcohol} = \frac{60 \times \%\ \text{alcohol in drink} \times \text{ozs. drunk}}{\text{Your weight} \times 1000}$$

Rate of disappearance is .01 percent per hour. So say you're a trim 160 pounds, every inch a fighter pilot. At midnight you top off your tank with your fourth gin and tonic preparatory to a night of fighter pilots doing it better and an eight

Twelve hours between the bottle and the throttle



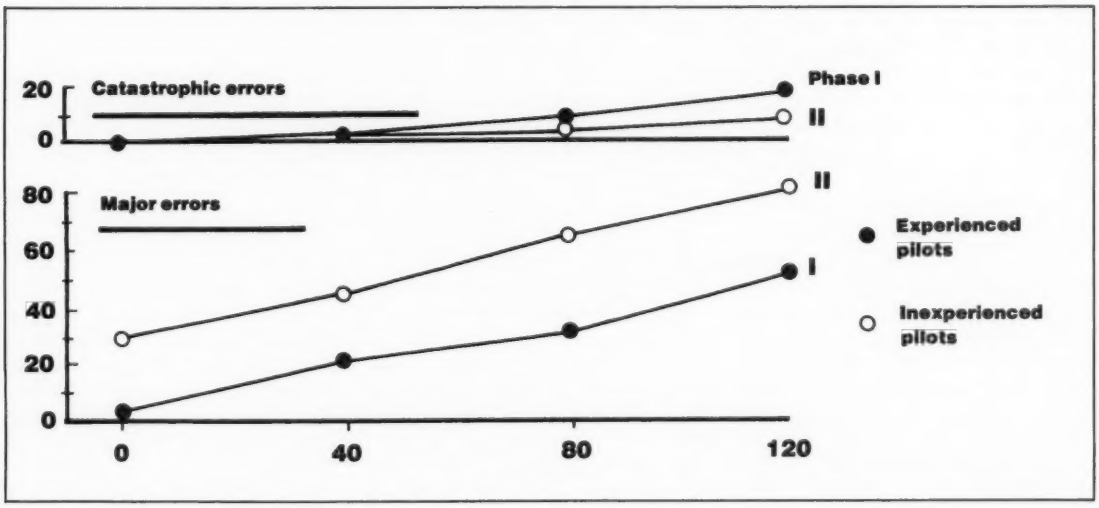
o'clock local training flight. Highest blood alcohol =
60 × (4 —1½ ounce drinks of 70 proof or 35% gin)—

$$\frac{60 \times 35 \times 6}{160 \times 1000} = \frac{118}{1600} = .074\%$$

Well, maybe you better walk home for starters, Mr. Fighter Pilot. And then, you must, in this case, wait a minimum of 7½ hours before you're thinking again, especially about the secondary tasks. "Well, I only drink beer." O.K., wise guy, try the math on beer.

Same results.

The point should be clear by now. If you are drinking, whether you know it or not, you have a performance decrement. It could be enough to generate a catastrophic error, and you might not realize it in a secondary task. Next time you're tempted, ask it again—"Who, me?"



Publications Anyone?

Tech pubs are getting a new look

Darrell J. Godier, DAC
Technical Writer, Maintenance Directorate,
Technical Publications Division, AVSCOM

ARMY AVIATION'S systems (hardware) have become more complex but more versatile, more costly but more efficient. Experience in the Republic of Vietnam bears this out.

We have in Army aviation an advancing technology. But what about its software—specifically, the publications? They are needed to operate, to maintain, to inspect, to overhaul. Have they advanced on the same scale as the hardware? You bet!

We've gone from -35 manuals to -34s for maintenance and from combined airframe/engine manuals to separate coverage. In cases where the models in a particular series were becoming difficult to manage collectively in one series of manuals, they were broken out and given separate coverage.

I've been told on numerous occasions that we in the U. S. Army Aviation Systems Command's Technical Publications Division have done an outstanding job. The fact that it was my wife Jacquelyn who told me doesn't mar the fact that we have tried to "keep up." We are constantly seeking through contacts with the field and industry to improve the way we give information to our users. Where are we today and where are we going?

First, consider maintenance test flights. Through the recent adoption of a suggestion, field users can expect to see individual maintenance test flight manuals for each Army aircraft. They will be numbered TM 55-XXXX-XXX-MTF and have a beautifully written introduction (mine!) giving all the necessary information to use the manual. These manuals will result in that maintenance test flight data which is presently in the aircraft -20s to be deleted. For those who attended the maintenance test pilots course at Ft. Eustis, VA, have no fear—they were in on it. You can expect to start seeing these manuals in the field in the very near future if you already haven't.

How about combined preventive maintenance manuals for Army aircraft? At present we have a daily, intermediate and periodic inspection manual for each aircraft. This combination was accomplished by placing three columns next to the inspection item and marking them D (daily), I (intermediate) and P (periodic). By placing X's in the appropriate column, you indicate what parts of an inspection must be completed to accomplish the applicable requirement. I might also mention that we're taking a hard look at the "critical inspection item" criteria versus the "mandatory safety of flight" criteria for the purpose of coming up with a logical method stressing the importance of looking at a specific area, item or component. Right now we feel like "critical inspection" items have gotten out-of-hand.

If the above improvements aren't enough, we have more. MIL-M-63026 (TM) which governs the preparation of maintenance manuals is being revised. Chapters between -20s and -34s are being standardized as much as possible. Part of this revision also involves the introduction of material at the beginning of a complex task which will tell the mechanics not only what special tools they need but also what condition the aircraft must be in (i.e., power on/off; serial number effectivity; consumable materials) and how many men will be needed to do the job, etc.—in short, all the info or tools a guy needs to do the job before he starts the job. We're also looking at the troubleshooting charts. Nothing firm yet but an improvement seems to be called for.

And then there is the engine -24 manuals. What goes in the engine manual and what goes in the airframe manual? Good question! You just can't seem to tell by comparing different manuals. So we're revising MIL-M-63028 which governs their preparation. A new criteria is being developed which will once and for all (we hope) resolve this.

Last, but not least (for now that is), there are the -10s and -CLs. We have MIL-M-63026(TM) which also covers -10s and MIL-M-63029 for the checklists. MIL-M-63029 is being revised not only for the checklists but also to include the detail requirements for -10 manuals. Logical, isn't it? I'm especially proud of this one. Checklist steps will be numbered. Performance charts are being redone to reduce their volume, simplify their use and just plain make them effective. Chapters in the -10s also are being resequenced and in some cases combined to give a standard place to find, for example, systems descriptions, performance charts, armament, etc. Don't sweat this one either because the U. S. Army Aviation School at Ft. Rucker, AL, is on it plus the flight test people from the Aviation Systems Test Activity at Edwards AFB, CA.

And that's what's new in publications!

ANNUAL AWARD
Monthly Winner
CONTEST

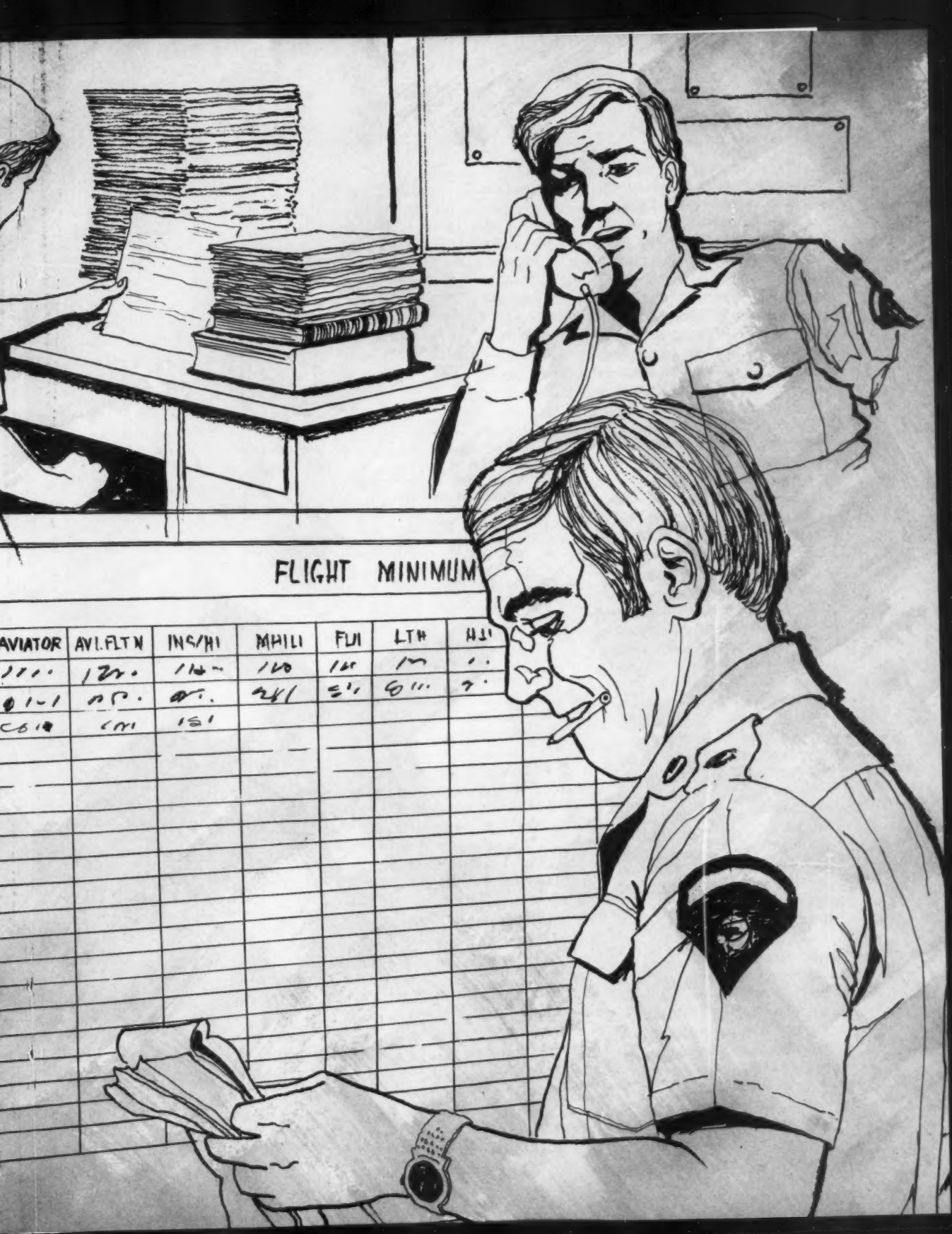
THE SCOURGE OF AVIATION

Specialist 6 Stephen E. Issak

"...during his first year he can make a mistake that would send chills up and down the spine of his operations officer"

WITHIN THE PULSING confines of every Army aviation flight operations lurks the *Scourge*. Who is this menace to aviators and crewmembers? He is neither the devilish lad who squeals with joy upon discovering an error on a carefully completed DD Form 175 nor that smug little rascal who fills page after page of flight schedules with tedious, ten-stop, 5-minute ground time each mission (and who just as smugly informs battalion when the OH-58As are all grounded for a one-time technical inspection—thereby canceling innumerable missions). No, our Scourge is meek, mild tempered, rarely heard or seen, but by far outdoes the clerks at the local finance center. Specifically, he is the flight records clerk. How do I know, you ask? I know, *'cause I are one!*

Recently, on a beautiful "zero-zero" day (no dash 12s ya know) I spent some time flipping through 7 years' worth of AVIATION DIGESTs. It occurred to me that with all the stories of aviators about other aviators, gunners, crewchiefs, et al., that no one has ever had much to say about the local custodian of the individual flight records file. Perhaps this distinct void has been a result of unprintable thoughts. Obviously, everyone in aviation has had at least one memorable run-in with the Scourge. But, alas, our for-


FLIGHT MINIMUM
AVIATOR
AVI. FLT N
INS/HI
MHILI
FLH
LTH
HJ'

gotten, unsung hero is certainly deserving of some mention; therefore, I have taken it upon myself to fire the first shot both for and against my brethren of the paper factories.

The flight records clerk is a curious creature, but before I fire my first salvo let's examine his background. Ideally, he is a school-trained clerk-typist (maybe two out of five are trained clerk-typist), skilled in administrative and clerical duties. Upon completion of an extensive 4-week course in digital finesse, he is channeled into flight operations. Here he receives simply scads of training in such fields as navigation, weather, IFR shorthand, flight plans (DD Form 175), aircraft characteristics, weight and balance, flight dispatching, dead reckoning, flight planning, map reading and applicable regulations. Oh yes, flight record files come in somewhere along the line. If my memory serves me correctly, out of the 4½-week-long course, almost a day and a half is reserved for and devoted to records. Upon graduation our skilled hero is assigned to the flight records section of a flight detachment where he gets a dose of on-the-job training (OJT) in "our way of doing things" as the outgoing clerk tells him.

Now during this OJT period Scourge learns more about what aviators are *not* supposed to do (such as log copilot hood, night and hood simultaneously, log instructor pilot hood and various other unusual entries) rather than how he is to actually handle flight records. His training in records auditing and closing comes either traumatically, at fiscal year end, or in slow progressions as aviators receive permanent change of station orders. One way or another, he learns the hard way, through his own errors as well as by the errors of others. Thus, it is easy to understand why during his first year on the job he can make a mistake that would send chills running up and down the spine of his operations officer.

Assuming that Scourge has lived through his embryonic year of hard knocks, let us imagine a day in the life of our flight records clerk. This day is not typical in

"G-3 just called . . . they need to know the number of aviators assigned, by type instrument qualifications, fixed and/or rotary winged . . . incountry time and shoe size"

that it covers most of the "extremes" that could occur. But this is purposely done here to make a point. By 0600 hours Scourge is off and running. By 0730 hours he is at his desk awaiting the arrival of yesterday's DA Form 2408-12s (aircraft flight logs). Looking at the schedule and dispatch sheets from the previous day, he notes that today should bring at least 15 dash 12s. He has a report to call in to battalion, in code, *prior to* 0900 hours. At 0830, the cutoff time for incoming dash 12s, he calls the sections to complain about the distinct lack of input.

• Utility: "Oh, yeah, we sent turtle down with them an hour ago. I'll see what happened to him."

• Observation: "They're on the way, Scourge."

• Fixed wing (command airplane platoon): "We didn't have any flights 'cause the only one that flew came back with gear trouble."

"Wait a minute, Prop," deducted Scourge, "if he flew then he should have a dash 12."

"Well, I'll check it out."

• Surveillance: "They're still in the bird."

"I'll give ya the bird if you don't get me those dash 12s!" fires back Scourge.

By 0915, battalion has called for the report twice. Scourge finally has the information from the dash 12s. With that done, he starts to transfer the time onto his temporary DA Form 759-ls! Captain Jet Ranger logged copilot hood again; CW2 Artie Rotation logged pilot hood by himself in an OH-58A; First Lieutenant Split D. Needles logged night from 1550 hours to 1700 hours (official sunset was at 1715 hours). Well, not much new here.

By 1030 posting of time is finished. Scourge gets his first cup of coffee as WO1 Spreadskids comes in to find out how much total time he has for the month (today is the 5th). Captain Flap needs a complete set of maps, 13 in the series. Sergeant First Class M. K. Wrench wants to switch some people on the TOE for flight pay, "Okay, I wanchatu take Smith, Carruthers, Trujillio and Ramerez off crew and make 'em noncrew. Then put Harris, Blanche, Melville and Rotorhead Morgan from noncrew to crew. Got it?"

Scourge nods his head in the affirmative as he contemplates the mountain of paperwork. "Next, drop Knuckles off flight for good and replace him with Thumbs Baskins. Lewis ain't T.I.-ing anymore so drop him and put Schnooks in there instead. Bleeder is PCSing so replace him with Henderson and that should do it for awhile."

"Right, Sarge, I'll get to it right away."

"When'll my boys get their orders—tomorrow?"

"I think it's gonna take about 2 weeks, you know how battalion is on orders," Scourge replies.

"Yeah, I guess so, see ya later. Scourge."

Lunchtime means an hour away from the factory; Scourge dreamily looks forward to his lunch and mailcall.

In the messhall, billed as "The Best Mess Around," Scourge is suddenly surrounded by five irate crewchiefs. "Hey Turkey, how come I didn't get my hostile fire pay for last month?"

"Yeah, me too!"

With a big long sigh Scourge produces his standard answer, "Well, either you weren't hostile enough or didn't make your six trips. Probably more the latter rather than the former, but it is close enough to make it a hard call." That stumps them long enough for Scourge to duck out the side door.

Stopping by the PX for a pack of cigarettes, Scourge muses, "I'm smoking more and enjoying it less."

2LT (the transponder kid) I. M. Sea grabs Scourge, "Hey, Scourge, what are the chances of getting on the next overseas flight?"

"Gee, sir, all I do is type the orders, I don't pick the crew."

"Yeah, yeah, don't give me that! You picked the last crew."

"No, sir, honest, you'll have to talk to the operations officer."

"Thanks for nothing, Scourge."

It would be 3½ more hours before Scourge would be able to retire to his hideout. "Say, Scourge," yells Staff Sergeant Mike Fox, the operations noncommissioned officer in charge, "G-3 just called and they got a new report requirement. They need to know the number of aviators assigned, by type instrument qualifications, fixed and/or rotary winged, aircraft qualifications, specify AC, IP and P in type, model and series, in-country time and shoe size."

"Shoe size?" Scourge gasps.

"Not really, I just threw that in but you might get the information anyway, you never know what those guys will want next."

So Scourge gets busy screening his 50 records. Two-thirds of the way through Sergeant Mike comes in again, "Forget the input, G-3 decided they don't need it."

Now starting his third pack of cigarettes for the day, Scourge posts the minima board, that 5-foot by 10-foot plexiglass monster that no one has ever learned to read correctly.

By now the day is all but over. As Scourge cleans off the top of his desk and covers his typewriter, CW2 Crash Cramer runs in. "Scourge, grab your DA 2397 series worksheets, we just had a precautionary. Gotta get a crash facts report off right away."

"Sir, we've got most of tomorrow to do it."

"Yeah, Scourge, by regulation we do, but the CO thinks differently, let's go."

So as the sun sets slowly in the west, Scourge settles down to a long evening of collating three different stories about what happened to the OH-58A when the seat belt was left unsecured and hanging out the door for the umteenth time.

I'm sure you agree that the day outlined above is an extreme case. But, try this one. In the space of 3 days I worked on an incident to flight involving personal property damage, two precautionary landings and a ground accident, while OJTing an assistant safety officer as the regular safety officer departed for leave on the first day. Oh, I almost forgot, we also had two vehicular accidents.

Granted, flight records clerks make "boo boo's," but give them a break. Take a day to observe not just his routine work but the extra stuff like monitoring standardization, safety, personally handing out FLIPs to make sure everyone gets a full set, answering questions which most people shouldn't even have to ask, digging up input for various and sundry report requirements from above, chasing after dash 12s, interviewing individuals involved in aircraft incidents, wording correspondence like a poet, typing continuity files and even typing officer efficiency reports. It's amazing that the records are in as good a shape as they are. Show me a flight records clerk who "gives a damn" and I'll show you a confident, self-satisfied, paranoid asset to Army aviation!

Now that the Army is slowing up a bit, let's take advantage of the knowledge gained over the past 7 or 8 years and readjust our methods of instruction (MOI). Aviation is a highly complex and critical field. No one can ever be overtrained. By expanding and realigning our formal training in all areas of aviation, we stand to win.

With a tad more emphasis on regulations, records administration, aviation safety (which is a definite *must*), standardization and reports control, the Army could really produce some terrific flight records clerks.

The Scourge can fool you; he may carry forward the wrong totals from time to time, but give him the right info, light a small fire under him and you'll discover that . . . he too is Above the Best!

The author was a flight records clerk when he prepared this story. His personal experiences at the close of the fiscal year provided much of the color

VIEWS FROM READERS

Continued from page 1

Sir:

Inclosed is a photograph of the girls in the 1973 Miss America, USO Show [see below]. The girls are in front of their 55th Aviation Company Helicopter Escort. They are from left to right:

Miss California	Dianne Wagner
Miss Kansas	Cindy Sikes
Miss Delaware	Cathy Lawton
Miss Oregon	Sandy Herring
Miss America	Terry Meeuwseen
Miss Maryland	Kathy Neff
Miss Indiana	Becky Graham

They are assembled at helipad 201, Seoul, Korea, on 18 August 1972 just after landing, completing another outstanding performance during their 13-day tour of the Republic of Korea.

The Miss America Show performed at nearly all the major military bases in Korea. Their shows included singing, dancing and even a banjo instrumental.

The 55th Aviation Company enjoyed the mission of escorting the Miss America Show throughout most of its tour of Korea. Along with the commanding officer, Major Charles E. Dexter, all of the officers and men of the 55th Aviation Company say an extra special "thank you" to Miss America and all of the girls for the visit and the opportunity to serve you during your stay in Korea.

CW2 Thomas Caples
PIO Officer
55th Aviation Company
APO San Francisco 96301

Sir:

My compliments to Mr. Ted Kontos, USAAAVS, on his informative and well written article, "Important Byproduct For The Commander," in the April issue. It is one of the finest articles I have read in the DIGEST.

I have made this article recommended reading for all our aviators . . . in addition the 101st has adopted an SOP

1973 Miss America Show in Korea—see letter above

which requires our company commanders to carefully evaluate pilots involved in an accident or incident, where pilot error . . . was suspected or definite, before returning him to full flying status. This evaluation is to determine if an IP or pilot should fly as a copilot for 60 days or where indicated receive remedial training with an IP as required.

CW3 Grover W. Brooks
Aviation Safety Officer
101st Aviation Battalion
Ft. Campbell, KY 42223

Sir:

Reference is made to William P. Christian and Gene Berta's June 1973 article "Thermal Runway." The article provided an excellent and valid checklist for aviators and crewmembers; however, we have experienced numerous Ni-Cad battery failures despite the fact that the checks have been followed diligently. Still, batteries boil over, leak profusely and corrode the avionics deck on our OH-58As almost to the point of structural failure.

Is there hope for the future? Certainly, no one can argue with the fact that an effective maintenance program is essential, but I feel the Army purchased a bad system and until an improved battery is developed and purchased, the high cost of OH-58A maintenance will increase despite the quality of user maintenance.

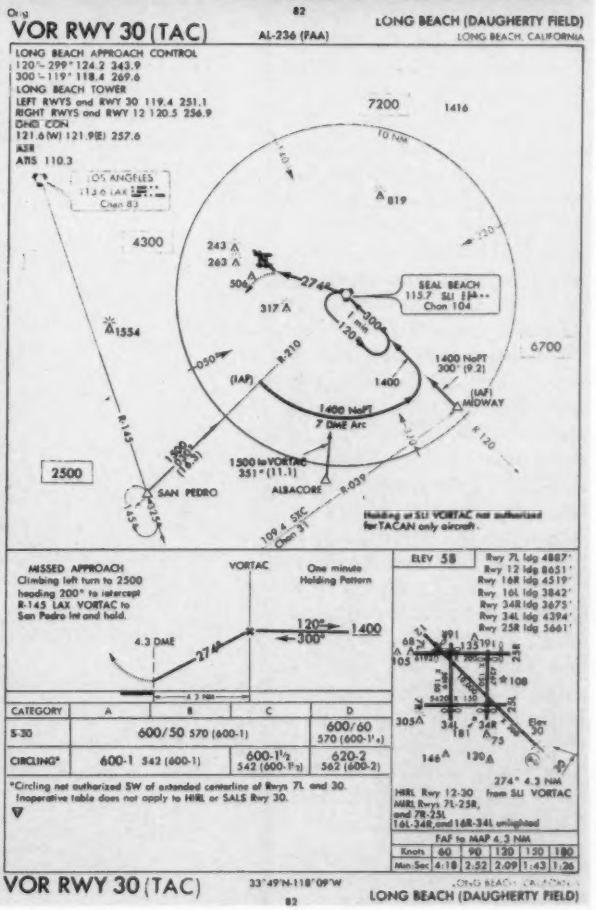
CW2 Nathan B. Van Keuren
HHC, 3d Bde, 2d AD
Ft. Hood, TX 75646

• Yes, there is hope. The U. S. Army Agency for Aviation Safety (USAAAVS) has received information from the U. S. Army Aviation Systems Command (AVSCOM) that the Aircraft Division of Hughes Tool Company is currently testing a new Ni-Cad battery in an OH-6A helicopter. This battery has new inter-cells, more head space above the cells, a different battery case and a positive vent system. If this battery proves satisfactory we may have a solution to our Ni-Cad problems. So far no problems of overheating, electrolite spillage, etc., have been reported during tests. AVSCOM is also working with the Navy and Air Force to determine if a common Ni-Cad battery can be developed for use by all three services.

INSTRUMENT CORNER

Q. Recently on an IFR flight to Long Beach, CA (Daugherty Field), I was cleared for a VOR RWY 30 approach. When I turned to the approach chart in VOL 2 of Low Altitude Instrument Approach Procedures, I found that the approach chart read VOR RWY 30 (TAC). What does the (TAC) indicate?

A. The DOD Flight Information Publication, IFR Supplement effective 16 August 1973 under the Special Notices Section, page 444, states: "A limited number of VOR instrument approach procedures based on a VORTAC facility have been approved for use by TACAN equipped aircraft. These procedures are identified by the term '(TAC)' printed adjacent to the name of the procedure, e.g., VOR RWY 30 (TAC). This added information does not change the name of the procedure. It merely tells both the pilot and controller that a 'VOR RWY 30' instrument approach may be executed by aircraft using TACAN. Air traffic controllers will not refer to the term 'TAC' in their air traffic control communications (see figure at right).



NOTICE

The PILOT TO FORECASTER SERVICE (PFSV) has changed to PILOT TO METRO SERVICE (PMSV) and is being phased into issues of FLIP manuals beginning with the August 1973 issues

I Learned About Flying
From Them

...They were the ones that taught me that I will never know all there is about flying...

Captain Benjamin F. Vandervoort

I WAS GOOD. I had just completed a tour in the Republic of Vietnam and had a thousand hours of flying time under my belt. No one could teach me anything about flying a helicopter! Put a pair of blades on it and I'll make it fly!

That was back in June 1966. Since then my thousand hours of flight time has grown to 4200 hours and I've learned that I'm not as good as I once thought.

But let's go back to that time in 1966 when I signed into Ft. Wolters, TX, where the Army's Primary Helicopter School was located. I was fortunate enough to be in one of the last military classes to go through both civilian and military instructor pilot training. At that time military students were first taught by Southern Airways how to instruct the presolo and primary phase of flying in the OH-23. We were then transitioned into the TH-55 by military instructors and turned loose to our respective flight commanders.

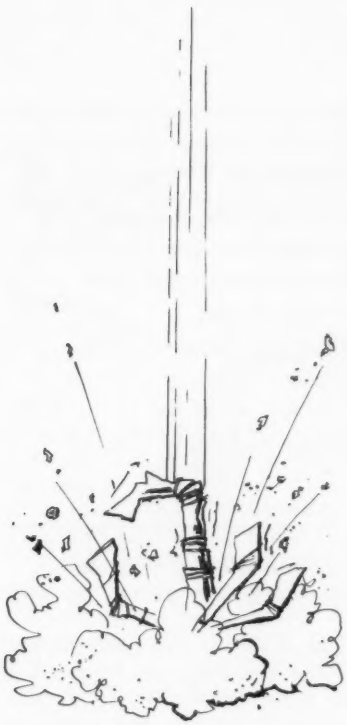
Upon being assigned my first students, I suddenly realized something: *I'm supposed to teach them how to fly!* All of the devious little tricks I used to pull on my old instructors flashed across my mind. Every attempt I had make at killing that wizened old pilot was remembered. Each time, where he had waited until the last moment to salvage us from disaster, was realized. Now, they can't expect me to do that with my students. . .?

But they did.

My first few classes were a disaster—at least to my mind they were. I must have done something right though; all of my students passed their check rides—that was back when they had check rides. But, oh, those first few classes. I couldn't keep up with my students. "Sir, why aren't you supposed to autorotate an OH-23 from above 10,000 feet?" Or, "How does the degree of bank affect the relative gross weight of the aircraft?" Gad! Back to flight school.

I started by devouring the dash 10 for the OH-23D. At the same time I learned my planned lessons a week in advance—just in case

Each try I had made at killing that wizened old pilot was remembered



"No, that's wrong. Let me show you how it's done"

one of the sneaky ones was reading ahead in the program. I got a copy of their ground class schedule. I learned quickly that when they were having meteorology I would be besieged by such questions as, "Could you explain the difference between an altostratus and an altocumulus cloud?" Or take navigation—"Would you please show me how to compute wind drift with the E-6B?"

E-6B! Now, what was an E-6B? Occasionally, I suspected I was doing their homework for them. Fortunately, I didn't get too many calls from irate ground instructors.

My control touch improved considerably those first few classes. There is nothing quite as embarrassing as saying, "No, that's wrong. Let me demonstrate how it's done." And then making the same error. Control touch had to improve. I didn't mind a few students inadvertently trying to kill both of us, but I felt I did not have to help them.

After a while I got better. I started getting a feel for the aircraft. I began to get a reasonable idea of both my own and the aircraft's capabilities and limitations. The ability to communicate with my students became easier. I now knew several different techniques I could use to "get through" to them. Things were really shaping up. Yes, sir, I could handle anything.

We recovered at about 50 feet above the ground with the rotor rpm at a setting so low I still don't know how the aircraft stayed in the air. I didn't think he would hold pitch in a simulated forced landing like that! I learned a lot from that incident. I did from all of my students.

The 2 years I spent as an instructor pilot at Ft. Wolters were perhaps the most rewarding time I have spent in my life. To take a fledgling aviator and watch him progress and learn to fly fascinated me. I learned more about flying in those 2 years than is imaginable.

To the students who had me as their instructor during the time from June 1966 to June 1968—thank you. You taught me a lot about flying. I hope I did the same for you. And the most important thing you taught me is that I will never know all there is to know about flying.

To those pilots who do know all there is to know about flying—congratulations on your retirement.

We recovered at about 50 feet . . . the rotor rpm was so low, I don't know how we stayed in the air

THE MAIN INGREDIENT

continued from page 3

The pilot, his wife and the crew chief released their seat belts while submerged and then surfaced. They clung to the floating fuel cell until they were picked up by fishermen in a boat. All three received major injuries and were taken to a hospital. Divers were not able to recover the bodies of the OH-58 crew chief and the pilot's son until the following day.

Following are excerpts from statements taken during interviews after the accident:

Safety Officer

Q. Were you aware that the pilot made low passes over the airfield?

A. Yes, I was aware he did them on test flights. I talked to him and he said he did it to boost morale.

Q. How was the pilot on normal missions?

A. He was as safe as anyone else.

Q. Did anyone else in the unit make low passes over the airfield?

A. Yes, it was a practice for DEROS flights.

Q. As a safety officer do you feel making high-speed low passes over the airfield constitutes operating an aircraft in a careless and reckless manner?

A. I don't think it was right, but I don't think it was careless and reckless.

Q. Was your platoon leader aware that the pilot made low passes over the airfield?

A. I'm almost sure he was.

Q. Was the company commander aware of the low passes over the airfield?

A. One time he saw the pilot making a low pass and I believe he talked with him about it.

Q. How long ago did the company commander stop low passes over the field?

A. About 3 weeks before the accident, when he saw the pilot making a low pass.

Q. What is the company's policy for obtaining weather for local flights?

A. There is no policy. The pilot is not required to get weather.

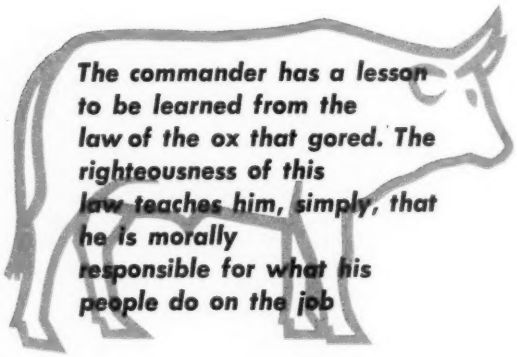
Q. Is there a local policy which says a pilot will not fly the day after he is duty officer?

A. No, it is up to the pilot.

Airfield Commander

Q. With respect to his flying ability and flying sense, how would you rate the pilot as an aviator?

A. Perfectly capable. He can handle an aircraft. It's evident from the number of hours he has.


The commander has a lesson to be learned from the law of the ox that gored. The righteousness of this law teaches him, simply, that he is morally responsible for what his people do on the job

Q. How did he handle the aircraft to your knowledge?

A. He'd been told several times about the taxi procedures on the ramp. I told him on one occasion, when he was taxiing in the vicinity of other aircraft, that he was taxiing much too fast and carelessly. There was one occasion that I had to reprimand him for flying low level over the river on a test flight and he said that it was just part of the test flight. I asked him why it had to be done low level. He said it wasn't really necessary. These were two occasions when I had said something about his flying. I thought there might be a possible safety hazard.

Q. About how long ago did these incidents occur?

A. About 3½ to 4 months ago.

Q. Was the pilot admonished by the company commander for low-level flying over the airfield?

A. The pilot had made a low-level pass over the operations building on the airfield. The company commander said that was no way to be treating a company aircraft, and if it occurred in the future he would take someone's flight pay away. This was 2 months ago.

Q. Have you seen any other pilots make low passes over the airfield?

A. Yes. I don't think there's a pilot here that, at one time or another, didn't make a low pass over the airfield, including myself.

Q. Was this low pass a common practice for individuals who were DEROSing from the unit?

A. Yes.

Q. How about low passes over water?

A. I don't know of anyone other than the pilot involved in this accident who might have done that.

Q. Are there any provisions in the airfield crash rescue plan for crashes occurring in the reservoir?

A. No, there isn't. That's a revision we're going to have to make.

Pilot

Q. Is there a unit SOP covering test flights?

A. No.

Q. Did you postflight the aircraft after the first flight?

A. I checked for leaks.

Q. Did you preflight the aircraft prior to the second flight?

A. I checked the fluid levels.

Q. Did you have a checklist on board the aircraft?

A. We had two; one for the aircraft and my own copy.

Q. Did you use the checklist?

A. Yes, on the first flight to run the aircraft up. I didn't use the checklist on the second flight.

Q. Did you brief your wife on emergency exits, seat belts, etc., prior to takeoff?

A. I told her to strap in and strap the baby in. The OH-58 crew chief helped her put her helmet on. I didn't brief her on emergency exits.

Q. What was the OH-58 crew chief's purpose on board?

A. He just came along for the flight.

Q. What was your altitude and airspeed while on downwind?

A. Six hundred feet and 80 knots, then with 30 pounds of torque I started a shallow descent, approximately 10 to 15 degrees nose low, and accelerated to approximately 110-115 knots. I was increasing torque to 35 pounds for more airspeed at the time of impact.

Q. Why did you decide to gain additional airspeed by descending when your altitude was already low?

A. No particular reason. I just nosed the aircraft over into a shallow descent. I planned to level off at above 180 feet.

Q. When did you initiate your level-off?

A. I thought it was at 50 to 100 feet agl.

Q. How did you reference yourself when leveling off?

A. I was looking outside the aircraft, not at my instruments. There was a tower to my right near the railroad station, approximately 75 feet high. There were some islands off to my left. By referring to these I thought I was approximately 50 to 100 feet high. I thought I had terminated my descent.

Q. Why did you decide to fly the second flight at a lower altitude?

A. To expedite the test flight.

Pilot's Wife

"We were just a couple of minutes into the flight. I was looking out the right window. Everything seemed OK to me. The first time I knew something was wrong, water was coming up through the floor. We started going down. When I unstrapped myself, I was already completely under water. I was holding on to the baby, but I lost hold. The baby went down. I grabbed something floating. I don't know what it was or how I got up to it. I can't swim so I don't know how I made it. We stayed afloat maybe 15 minutes and were then rescued by fishermen in boats."

Q. Were you strapped in?

A. Yes.

Q. Did you have a helmet on?

A. Yes, but it wasn't snapped.

Q. Did you retain the helmet in the crash?

A. No.

Q. Where was the baby sitting?

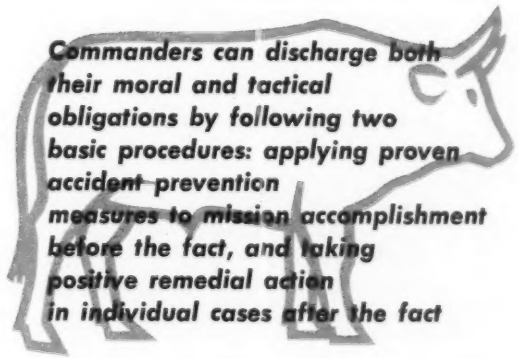
A. At the right window seat.

Q. Was he strapped in?

A. No, I was holding him with both arms.

Findings

"1. Crew error is a factor in this accident in that the pilot misjudged his altitude. The reason for this


Commanders can discharge both their moral and tactical obligations by following two basic procedures: applying proven accident prevention measures to mission accomplishment before the fact, and taking positive remedial action in individual cases after the fact

THE MAIN INGREDIENT

error in judgment can be attributed to the inherent difficulty in judging height over water while flying at low altitude at a high rate of speed.

"2. Crew error is again a factor in this accident in that the pilot elected to perform a test flight requiring a high rate of speed, at low altitude over water. This can be attributed to the fact that the pilot exercised poor judgment in an effort to expedite the test flight, and to the fact that the pilot regularly made low passes during the conduct of test flights.

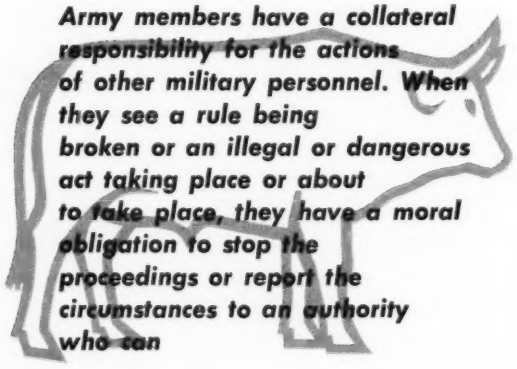
"3. Supervisory error is a factor in this accident in that the platoon commander, being aware that the pilot regularly made low passes during test flights, failed to take adequate corrective action to cause the pilot to cease this unsafe practice. This can be attributed to the fact that the platoon commander is relatively inexperienced as an aviation commander, this being his first aviation assignment.

"4. Findings uncovered during the course of the investigation not considered to have contributed to the accident:

"a. Unauthorized personnel were on board the aircraft during the conduct of this flight.

"b. Extraneous passengers were on board the aircraft during the conduct of a maintenance test flight.

"c. That one of the fatalities in the passenger section of the aircraft occurred because the victim was not adequately restrained. This can be attributed to the seats which became detached from the aircraft."


Army members have a collateral responsibility for the actions of other military personnel. When they see a rule being broken or an illegal or dangerous act taking place or about to take place, they have a moral obligation to stop the proceedings or report the circumstances to an authority who can

Statement of Reviewing Official

"Concur with the findings of the board with exception to finding number 3. The fact that the platoon commander was aware of a hazardous situation within his command and failed to initiate corrective action should not be excused by the fact that he 'is relatively inexperienced as an aviation commander, this being his first aviation assignment.' Awareness of an unsafe practice and failure to remedy it is an error in judgment."

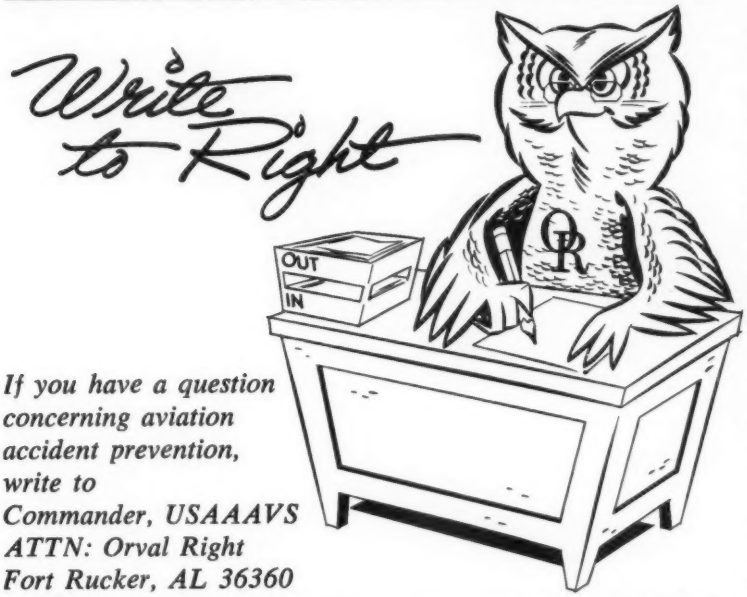
Following are excerpts from a letter written by the commander (a 4-star general) about 2 weeks after the accident:

"Rules and regulations concerning the operation of Army aircraft are a result of costly experience. In general, their purpose is to prevent accidents, injury and loss of life, the loss of equipment/resources, and the misuse of government equipment. Flight regulations for U. S. Army aircraft and authority for transporting passengers are contained in AR 95-1. Army personnel responsible for operating aircraft or supervising aircraft operations have an obligation to know, understand and comply with the provisions of AR 95-1 and other applicable regulations published by competent authority. In addition, since it is not feasible to publish a rule covering every possible circumstance, Army personnel have an obligation to use mature judgment and common sense and to refrain from actions that would result in unnecessary exposure to accident and injury.

"Army members also have a collateral responsibility for the actions of other military personnel. When an officer or soldier observes a rule being broken or an illegal or dangerous action taking place or about to take place, he or she has a moral obligation to stop the proceedings or to report the circumstances to an authority who can.

"Other Army personnel at the airfield were aware that the woman and child were aboard the aircraft before takeoff. There is no record of any attempt to stop the flight or report the situation to supervisory personnel.

"On another known occasion, unauthorized passengers were carried in an Army aircraft. Since in both instances, crewmembers, as well as other unit personnel, knew that unauthorized passengers were being transported, it is evident that not all have been sufficiently impressed with the importance of regulations concerning passengers on military aircraft. This accident is a tragic example of the consequences that can result from disregard of regulations."



If you have a question concerning aviation accident prevention, write to
Commander, USAAAVS
ATTN: Orval Right
Fort Rucker, AL 36360

Red Face and Ear

Thought I would drop you a line about an embarrassing incident that happened to me the other day. I had a stopover mission and, after shutdown of my OH-58, I hung my helmet from the chinstrap on the hook above the console. The time was 1100. We returned at 1330 and by the time I got myself and everyone strapped in and went through all the checks it was almost 1345.

Well, you know how hot it can get in south Louisiana in August, and the river of perspiration was already flowing down my back when I unstrapped my helmet and put it on. It was unusually warm as it slipped over my ears, but I was warm all over.

After becoming airborne, we cooled off, but I still felt a tingling sensation on my left ear. The return flight was only 45 minutes and uneventful, but the tingling sensation persisted. To my surprise and chagrin, when I went to the pilot's locker room to change my flight gear, I discovered I had sustained a blister on the upper rim of my left ear.

Rather obvious, isn't it? My sound suppressor cups were black, and were directly below clear plexiglass for almost 3 hours. So when I put the helmet on, the heat was dissipated and my left ear, which probably was not slanted properly inside the cup, was pressed against the black cup with the 3 hours of sun heat.

If anyone doesn't believe that black absorbs heat, have them check with me. So now I have grey sound suppressor cups, and don't do stupid things like leaving my helmet upside down in direct sunlight anymore.

Thought I would pass this on so that it might prevent some other aviator from being embarrassed by doing such a stupid thing and getting a red face and ear, also.—State Aviation Officer

CH-47 Pilot Qualifications

Is there a publication that requires that both pilots in the CH-47 be qualified in the aircraft?—ASO

The dash 10 for the CH-47 requires a minimum crew of pilot, copilot and flight engineer. Although not specifically stated, we believe this statement indicates that both pilots must be qualified in the aircraft. The configuration of the cockpit is such that a second aviator not qualified in the aircraft would be of insufficient assistance with routine operations and would certainly be a hazard during an emergency. Since there is only pilot training available and no provisions for training a copilot, it follows that if two aviators are required, then both must be CH-47 qualified.

Water Detection Kits

In aviation we keep a good eye on our fuel, for obvious reasons, with all the checks we make daily. This past week, however, we ran into a problem with our fuel contamination pills (detection kit, water, automotive and aviation fuels, FSN 6640-892-2264). While in storage all of our kits became contaminated and turned pink. Our POL sergeant here said that you could take the contaminated capsules and restore them by placing the contents of the capsules in a large pan, placing that in the oven, and at a low temperature draw the water out, until the powder again turned white. Is this correct and is the kit good after once being contaminated and the moisture drawn off in the manner I have described? —CWO, aviator

Although oven drying is an approved technique for decontamination of the old-type humidity indicator plug on the J2 compass system, it is not approved for the decontamination of the water detection kit. The reliability of the detection kit after oven drying is questionable. Your best bet is to destroy the contaminated kit and replace it with a new one, the cost of which is minimal.

Autorotations to an Open Sea

Problems in Depth Perception and Procedure

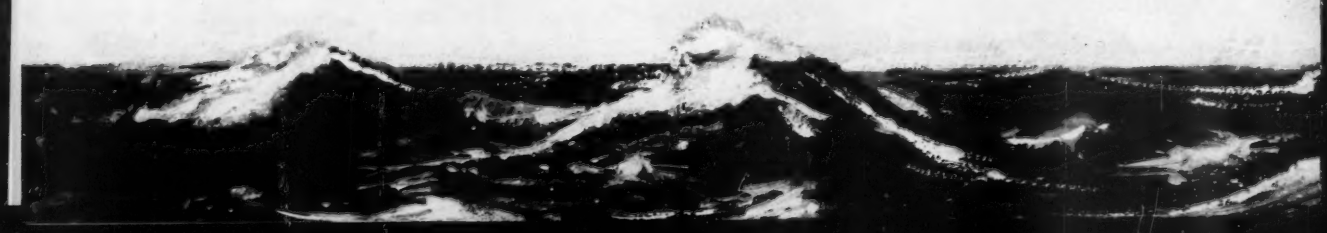
ORVAL RIGHT, our chief advisor on matters of aviation, recently handed us a request from an aviator stationed in Hawaii for any information we might have concerning a pilot's depth perception during autorotation to open seas. We could not find a definitive treatment of the subject under one cover that would provide a handy reference, so we decided to synthesize all the information we could glean from literature and from interviews with Naval, Coast Guard, Army and Air Force personnel experienced in overwater flying. The following paragraphs contain the resulting synthesis, which includes a discussion of the principles involved in autorotative perceptual tasks, an analysis of the perceptual difficulties encountered by the pilot in open-sea autorotations, and the conclusions we derived from our treatment of the problem.

Perceptual Tasks

Basic perceptual principles involved in sea autorotations are similar to those in land autorotations with the obvious exception of touchdown surface. The pilot's task in performing autorotations to a smooth, untextured sea is significantly different from his task in autorotations to a rough, highly textured sea, and both are a "whole new ball game" compared to land autorotations. The basic problem is the pilot's visual ability. To perform any autorotation, the pilot must successfully accomplish the perceptual tasks involved in maintaining correct aircraft attitude and accurately judging aircraft-to-surface distance.

Attitude Determination

In determining aircraft attitude, the pilot uses visual information from two major sources, the visual scene and the flight instruments. The visual scene comprises everything internal and external to the aircraft that yields visual cues useful in controlling aircraft attitude. The flight instruments provide pitch-and-roll information through the attitude indicator, yaw information through the turn-and-slip indicator, altitude information through the altimeter and air speed information through the air speed indicator. For flight under visual flight rules (VFR), these instruments provide a secondary source of visual information for control of aircraft attitude but are the primary source under instrument meteorological conditions (IMC). Because the problem at hand centers



John J. Kenney
Directorate for Technical Research & Applications

USAAAVS

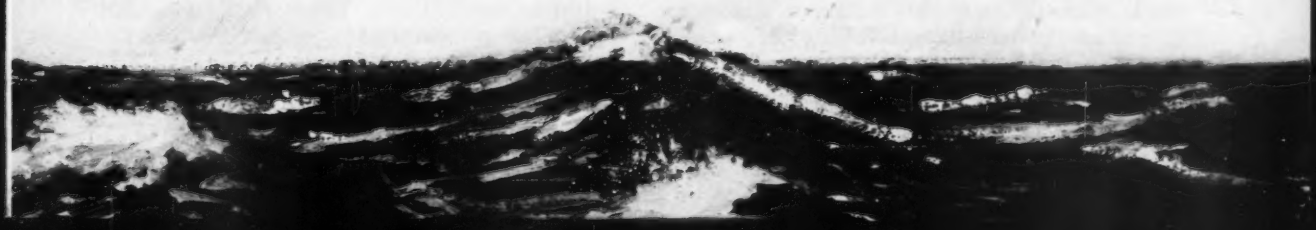
on the pilot's perceptual task, we are concerned with cues from the visual scene as they aid or hinder the pilot's perceptual task, rather than with the flight instruments.

In the pilot's perceptual task, he uses two primary elements of the visual scene to maintain control. The first element—external referent (ER)—is any point of reference in the external visual scene such as a mountain on the horizon, a ship, a buoy, seawall or waves on the water. Pilots use this point of reference until either it or the aircraft moves so far out of the line of sight that the ER loses its value as a point of reference or another ER is substituted for the old one. Because ERs may move by themselves or in relation to the aircraft as it moves, they are called dynamic reference points. They may be momentary (wave, whitecap or cloud) or permanent (mountain, ship, seawall or buoy) and thus serve as a point of reference for only a second or for several minutes or longer. The second primary element of the visual scene—an internal referent (IR)—is a point of reference in or on the aircraft and bears a relatively constant relationship to the pilot. Typical IRs are a rivet on the windshield framework, top to the instrument panel or edge of the rotor disc. Thus, the IR is a constant, as opposed to a dynamic, reference point because it moves with the vehicle and maintains a steady relationship with the pilot in his field of view.

When an IR is aligned with an ER so that a specific distance and angle are established between them, any movement of the aircraft about any of its rotational axes changes the distance or angle between IR and ER. The magnitude and direction of these changes between IR and ER are the visual scene cues pilots use in determining aircraft attitude. As an example, the pilot may align a rivet on the windshield frame (IR) with a ship on the horizon (ER). He determines pitch attitude by sensing vertical changes in distance and direction between the instrument panel top and the horizon, and yaw attitude by sensing lateral changes in distance and direction between the windshield frame rivet and the ship.[1]

Distance Determination

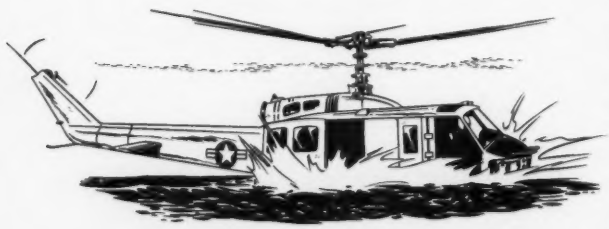
As mentioned earlier, the pilot's performance of a successful autorotation depends on his ability to judge aircraft-to-surface distance accurately, as well as on his ability to maintain correct aircraft attitude. As in determination of aircraft attitude, his judgment of aircraft-to-surface distances is a visual perception task in which he has two major sources of information: (1) instruments, which provide height-above-the-surface information through the altimeter and aircraft speed information from the air speed indicator (when used together, altitude and speed yield rate-of-closure information); and (2) the visual scene, which provides depth information from cues associated with ERs. The principle involved in depth perception is adjacency.[2] This principle asserts that perceived distance (size) of an object is determined by distance (size) cues provided by objects adjacent to the target object. The adjacency principle operates so that well-defined objects close to the target provide



better distance (depth perception) cues than objects that are not as well defined and that are further away from the target object. During autorotations then, pilots are continuously judging the distance between aircraft and touchdown area by modifying distance information from depth perception cues of ERs in the touchdown area with rate-of-closure information from the altimeter and air speed indicator.

Difficulties in Open-Sea Autorotative Perceptual Tasks

With this discussion of the visual perception tasks involved in the performance of autorotations in mind, let's look at the difficulties arising in the pilot's perceptual task during over-sea autorotations out of sight of land when the sea is smooth/glassy and when it has rough/high swells. From the discussion on visual



perception, it becomes apparent that only autorotations over smooth/glassy seas present significant visual perception difficulties because rough seas provide an abundance of well-defined ERs (waves and whitecaps) close together (adjacency principle) in the touchdown area. However, autorotations to rough seas do present considerable procedural difficulties and will be treated after dealing with the visual perception problems in autorotations to smooth/glassy seas.

Autorotations to Smooth/Glassy Seas

Autorotations to smooth/glassy seas pose visual perceptual problems to the pilot both in determining aircraft attitude and in judging aircraft-to-sea distance. In the discussion of these problems which follows, unrestricted visibility is assumed.

In maintaining aircraft attitude during an autorotation to a smooth/glassy sea, the pilot has no problem in determining vertical (pitch) attitude because the horizon (ER) is clearly visible and easily aligned with an IR (e.g., instrument panel top). However, he experiences some difficulty in determining yaw (lateral) attitude because a waveless horizon offers no ER with which to align the IR. In practice, fortunately, maintaining yaw attitude without an ER is not a significant problem because pilots develop a sense for detecting when the aircraft is out of trim, and yaw information is readily obtained from the ball in the turn-and-slip indicator.

Unfortunately, the visual perceptual task of judging aircraft-to-sea distance does present a significant problem, especially to Army aviators in Army aircraft. Let us assume that there is no wind and the pilot decides to autorotate straight ahead. His next procedural step is to select a touchdown target. The pilot therefore decides to follow autorotation procedures mechanically and let the touchdown point simply be where his skids hit the water. He then establishes best glide air speed and starts planning to flare 20 degrees nose up (a deceleration flare) at about 100 feet and maintain the flare until air speed is about 20 knots and altitude about 50 feet. He now rotates to 5 degrees nose up (levels aircraft to touchdown attitude) by applying forward cyclic and then applies collective at no lower than 10 feet to stop descent.[3] Successful execution of these procedural steps enables the pilot to touch down with minimum forward water speed and vertical impact force. The pilot's greatest difficulty is deciding *when* to initiate each of these procedural steps because he cannot accurately judge aircraft-to-sea distance solely by visual cues from the touchdown area. The problem is a lack of depth perception because a smooth/glassy sea provides no ERs. That is, there is neither a target ER nor an ER adjacent to the target area to provide the distance (size) cues necessary for perceiving depth and it is almost like trying to land on a mirror. For an autorotation under these conditions, the pilot's safest route is to rely heavily on instruments in initiating each procedural step after best glide air speed has been established.[4]

Performing instrument autorotations to smooth/glassy seas is especially difficult for Army aviators flying Army aircraft. First, it would be a safe wager that very few, if any, Army aviators have practiced autorotations to smooth/glassy seas relying primarily on instrument procedures. In fact, they are relatively inexperienced in flying over large bodies of water and in performing full instrument autorotations. Second, performing an instrument autorotation requires precise altitude information, and the Army aviator finds himself at a distinct disadvantage because his aircraft most probably is equipped with a barometric

altimeter. Compared to radar altimeters used by the Navy and Coast Guard, the barometric altimeter is relatively inaccurate at lower altitudes where precise altitude information is critical in determining when to initiate each step in the autorotation procedure. Therefore, if instrument autorotations to smooth/glassy seas are anticipated, Army aviators flying aircraft without radar altimeters should ensure their barometric altimeters are functioning correctly and should reset them periodically during each flight. Thus, inherent inaccuracies of the barometric altimeter can be minimized, thereby encouraging Army aviators to rely on instrument procedures instead of deceptive information from a glassy sea.

Autorotations to Rough Seas With High Swells

As noted earlier, the pilot encounters no significant visual perception difficulties in determining aircraft attitude or judging aircraft-to-sea distances in rough seas with high swells. In such seas as these, frequently occurring wave interactions serve as momentary but continuous ERs on the horizon for detecting changes in yaw attitude, and the shadows created by wave swells and whitecaps of choppy waves provide adequate ERs for judging aircraft-to-sea distance. However, the same wave swells and rough chop which aid in the pilot's visual perception tasks require that he take great care in selecting the touchdown area. To minimize impact force, he must consider such factors as wave swell height, period, length, direction and velocity as well as wind direction and velocity. The greatest danger is landing into a large oncoming swell or in the "trough" between swells. In each event the aircraft is covered with water before the occupants can get out. Not as dangerous, but still hazardous, are landings made into oncoming choppy waves. Shortly after the skids hit water, the nose tends to "tuck" into waves. If the oncoming chop is a foot or more in height, the tucking tendency increases in severity such that even a moderate nose-up attitude may not prevent the aircraft from flipping over.[5]

Escape From a Sinking Aircraft

In the interest of flight safety, we must note that evacuations from aircraft in water present one obvious major hazard for occupants not found in evacuation from aircraft on land—that of being trapped in a sinking aircraft. A natural but lethal tendency is for the occupant to inflate his life preserver before he gets out of the aircraft. If he does, rising water and the inflated life preserver may block the exit and trap him in the aircraft. Occupants should not inflate their Mae Wests until they have escaped from the sinking aircraft.

Conclusions

The pilot encounters two different problems involved in autorotations to open seas. First, autorotations to smooth/glassy seas present visual perception difficulties in maintaining aircraft attitude (sensing yaw position) and judging aircraft-to-sea distance (depth perception). The pilot can overcome these difficulties if he:

- Follows procedures and instructions in the *Flight Handbook* and the *Operator's Manual* (dash 10) for the particular type/model/series of aircraft he is flying.
- Adheres to instrument autorotation procedures as closely as possible.
- When radar altimeters are not available, checks the barometric altimeter carefully for accuracy and updates it periodically during flight.

Second, autorotations to rough seas with high swells present no visual perception problems but do involve serious difficulties in ditching. The pilot can overcome these difficulties by following well-documented rough-sea ditching procedures found in *Aircraft Emergency Procedures Over Water, Flight Handbook,* and the dash 10 for the particular type/model/series of helicopter.

Escaping from a sinking aircraft can present hazards that can be avoided if the pilot is familiar with, and instructs crew/passengers about, pertinent information found in the dash 10 for the particular type/model/series of helicopter.

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[1] For an in-depth analysis of this perceptual process, see W. G. Matheny and J. R. Thielges, *Analysis of Visual Discriminations in Helicopter Control* (Technical Report 71-13, Human Resources Research Organization, Alexandria, Virginia, June 1971).

[2] Walter C. Gogel, *Size Cues and the Adjacency Principle* (Report 63-28, Federal Aviation Agency, Oklahoma City, Oklahoma, November 1963).

[3] *Flight Handbook and Standardization Manual,* CG-384-1, CG to 1H-52A-1, Amendment No. 6 (September 1963).

[4] *TM 55-1520-228-10, Operator's Manual, Army Model OH-58A Helicopter,* (Department of the Army, 15 January 1973) pp. 4-5, 4-6, and 7-7, and fig. 14-22).

[5] See the dash 10 for your particular aircraft and *Aircraft Emergency Procedures Over Water* (FM 20-151, OPNAV INST 3730.4A, AFM 64-6, and CG 306, November 1968) for a full explanation of emergency landing procedures under these conditions.

Aviation Safety Awards

CHAPTER 7, AR 385-10, dated 16 September 1968, which covered the Broken Wing Aviation Safety Award, was revised and Change 3 to this regulation was published on 25 April 1973. A significant change to the AR now permits student pilots to receive the award prior to graduation. Also incorporated are the established criteria for favorable and unfavorable consideration of nominees and other minute changes covering the Broken Wing Award. Not only does this regulation now cover the require-

P. R. Thompson
Directorate for Education and Prevention

ments for the Broken Wing Award but also incorporates the newly established unit awards of honor and merit.

The award of honor or merit is applicable to all active Army, National Guard and Reserve organizations having assigned aircraft, to include both Army-owned and Army-leased aircraft. The activities (e.g., detachment, company, battalion, group) that have maintained accident-free flying time during the preceding 36 months or have completed 20,000 consecutive accident-free flying hours for any period of time are eligible for the Award of Honor. All activities are eligible for the Award of Merit upon completion of 12 consecutive months of accident-free flight time. For the purpose of these awards, "accident" pertains to major and minor accidents as defined in AR 385-40.

Army activities meeting this criteria may be nominated for either of these awards by their next higher headquarters if the activities are continuing to pursue an active and effective accident prevention program. Nominations must be forwarded to the Commander, U. S. Army Agency for Aviation Safety (USAAAVS), Ft. Rucker, AL 36360, with the unit identification code, calendar period and hours flown during this period. This agency will verify the accident-free flight time and prepare the certificates which will be signed by the USAAAVS commander, who is also the Army Aviation Safety Officer. The certificates then will be forwarded to HQDA (DAPE-MPS), Washington DC 20310, for the signature of the Army Director of Safety who, in turn, will forward the certificates to the activity commanders.

THE JAMES MARTIN AWARD

The James Martin Award was established in 1969 by Sir James Martin to commemorate the saving of well over 1,000 lives by the Martin-Baker ejection seat. It is administered by the Guild of Air Pilots and Air Navigators of London, England, who each year invite the chiefs of the military services to submit nominations. The award is presented annually to only one individual who is a native of the British Commonwealth, the former countries of the British Commonwealth or the NATO countries.

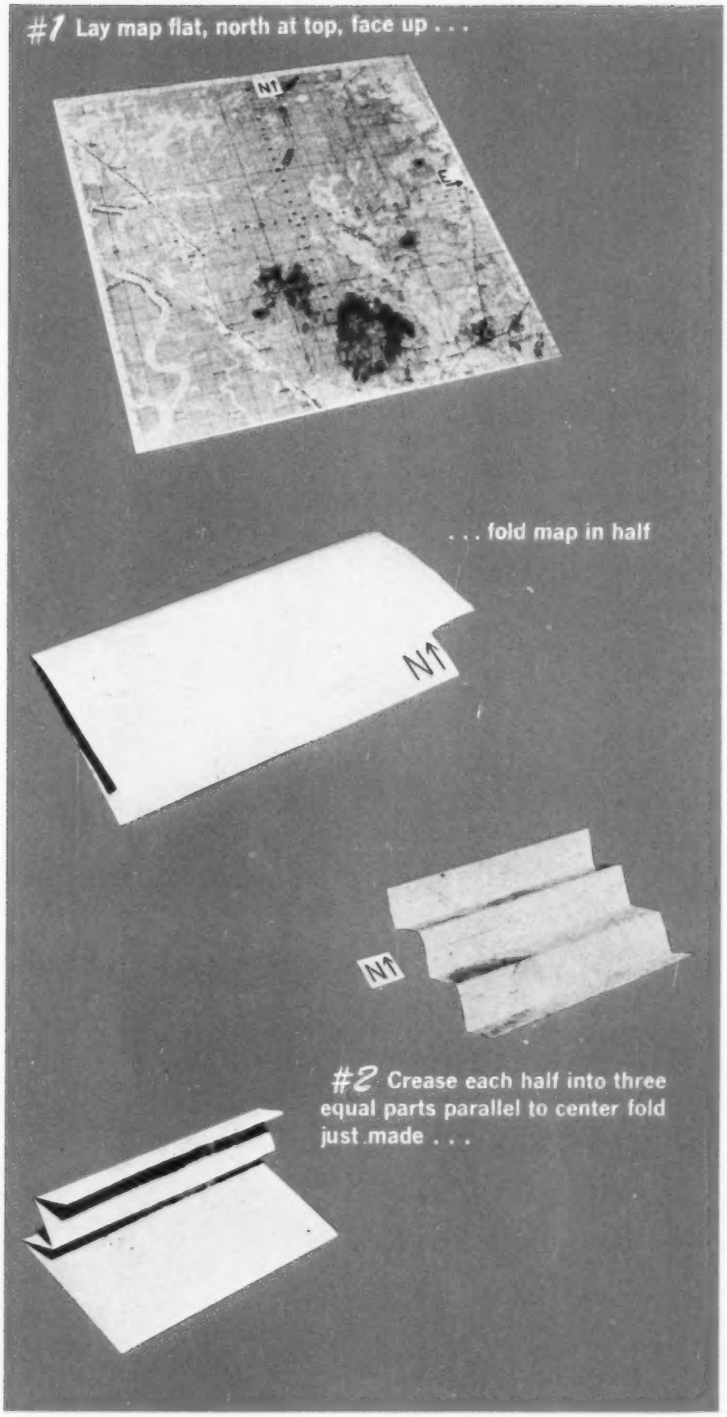
To be eligible for nomination, an individual must have made an original, outstanding and practical contribution or displayed an act of valor leading to the safer operation of military aircraft or the enhanced survival of military aircrews. An individual nominated for valor should have rescued persons from a burning aircraft or should have performed some act when airborne that contributed to bringing the aircraft safely back to base. Any other award received for such an act does not affect an individual from being nominated or receiving the James Martin Award. Persons nominated may be members of the Armed Services or Civil Service or may be contractor personnel connected with the design, manufacture, operation or support of military aircraft or related aircraft equipment. The closing date for submitting nominations is four months after they are sought by the Guild.

The award is a gold medal with the profile of Sir James Martin on one side and the crest of the Guild of Air Pilots and Air Navigators on the reverse side. The name of the individual receiving the award is also inscribed on the medal. In addition, the recipient also receives a small monetary award.

THE TACTICAL MAP AND YOU...

Because of repeated requests for copies of this article, the DIGEST is carrying it again. It originally was published in October 1970

CW2 Nile L. Harter Jr.


#1 Lay map flat, north at top, face up . . .
N1
. . . fold map in half
N1
N1
#2 Crease each half into three equal parts parallel to center fold just made . . .

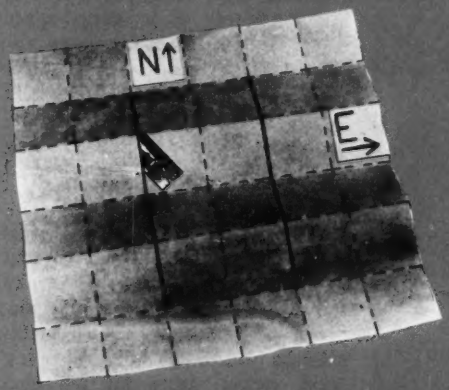
DURING MY LIMITED and somewhat trying career as an Army aviator, I've learned, like many before me, that the best source of information is the "grapevine," better known as the chain of command. Information flows from Senior aviator to student pilot and back again in a never-ending stream of knowledge. All aviators encounter and relate many problems daily, some of which are specifically related to a particular aircraft class and type, and others which pertain to aviation particulars that every pilot is likely to experience sometime during his career. Having been recently counseled and enlightened on one of those so-called common problems by a Senior aviator, I would like to share my findings with fellow aviators and make my contribution to that valuable grapevine.

Most publications used for instrument flight and radio navigation are not only designed for quick reference but are also physically small and easy to use in the cockpit. Most charts used for instrument flight come prefolded for systematic use in a limited-space compartment. But, what about visual flight publications and more specifically charts used in a tactical or less formal situation that an aviator might encounter while flying missions outside the continental United States?

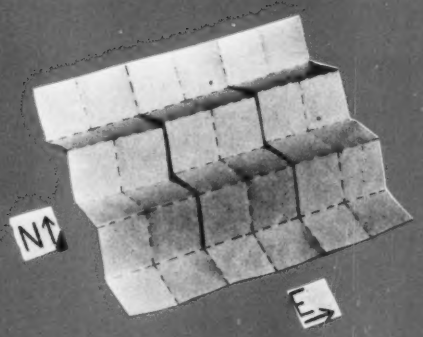
How about the aviator who must navigate by reference to a tactical or geographical type chart using the pilotage method? He must be, as they say, outside as well as inside the cockpit with his head on a good swivel using an unfolded 33 x 40 inch, 1:50,000 scale tactical chart wadded or stuffed in his lap in an already cluttered cockpit. How many ways do you know of folding a chart for quick and easy reference, small enough for storage in the pocket of your flight suit and efficient enough to provide an excellent tool for visual navigation?

#3 Open map face up, east at top . . .

fold in half turning top edge down to meet bottom edge and then repeat step #2

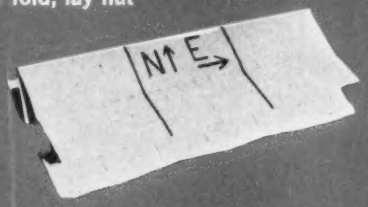


#4 Open map, lay flat north at top and with sharp blade neatly cut along heavy lines (dotted lines represent folds made)



#5 Disregarding cuts, using folds previously made, fold into parallel east and west sections

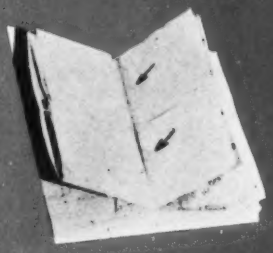
. . . open to center fold, lay flat



#6 Disregard cuts, using folds previously made, fold into parallel north and south sections

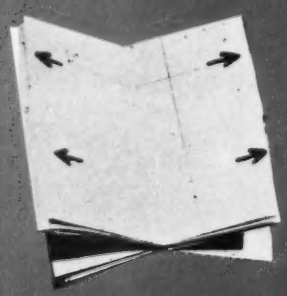
. . . open to center fold, lay flat

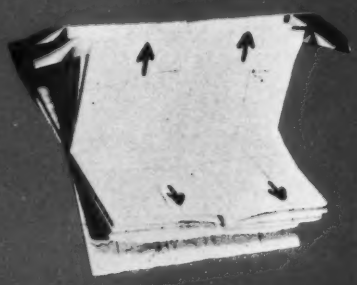
#7 Turn map over as it is now folded and using a single strip of tape form a binder (tape) as illustrated



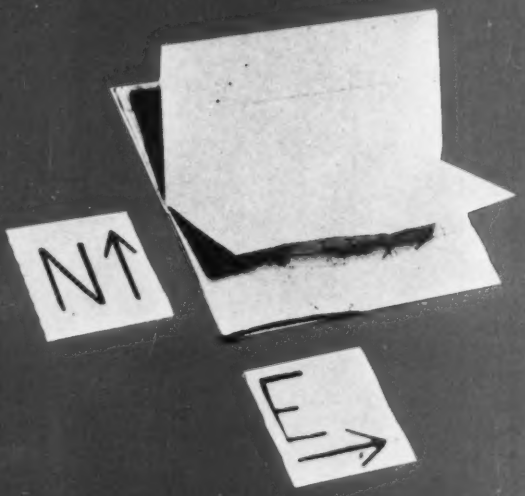
#8 Turn map over and using taped folds as a binder (step #7) you should now have a three-section, two-page book-map

#9 To finish the book-map for use, tape or glue the eight places where the edges you have cut come together (two places at each arrow)





#10 If the map has been properly folded, cut and taped, you will find that there are not only three usable sections from east to west but each of those sections can be folded north or south as desired. There are three usable sections folding north and south within each usable section folding east and west



Following step #10 your book-map should be ready for use, however, the addition of cardboard covers and gluing down of loose corners will prolong service and add to the durability. With little practice one will be able to navigate with ease to any given point on the map by simply folding or turning sections north, south, east and west. Good luck

If you have a question about personal equipment or rescue survival gear, write Pearl, USAAAVS, Ft. Rucker, AL 36360

PEARL'S

Personal Equipment & Rescue/Survival Lowdown

Authorized Flight Uniform

Recently, USAAAVS has received several inquiries from the field regarding the new flight uniforms that are being worn by several aviators. These uniforms are currently being worn for test purposes only. Presently, two types of flyer's hot weather uniforms, one a two-piece design and one a coverall design, both made of the newly developed "Nomex II," are undergoing test. The two-piece-type uniform consists of a shirt and trousers designed exactly like the Army's standard A flyer's uniform except that the fabric is "Nomex II." The one-piece coverall-type uniform is designed exactly like the standard A Air Force CWU-27/P coverall except that the fabric is "Nomex II." The primary difference between the Nomex II and the standard A uniform is that the Nomex II has two layers of material whereas the standard A has one layer. At the end of test, the features of both test uniforms will be compared with those of the standard A to determine the user's preference and acceptance for Army use. But until the Army finds a more suitable flight uniform that offers better fire protection, comfort, appearance, durability, etc., the following is the current standard A uniform to requisition as contained in chapter 2 of Supply Bulletin 700-20, effective 1 September 1973.

FSN	Shirt Flying Mens: High Temp Resistant Nylon Twill OG 106
8415-935-4891	Ex sm short
8415-935-4892	Ex sm reg
8415-935-4894	Sm short
8415-935-4895	Sm reg
8415-935-4896	Sm long
8415-935-4897	Med short
8415-935-4898	Med reg
8415-935-4899	Med long
8415-935-4900	Lg short
8415-935-4901	Lg reg
8415-935-6200	Lg long
8415-935-6201	Ex lg short
8415-935-6202	Ex lg reg
8415-935-6203	Ex lg long

FSN	Trousers Flying Mens: High Temp Resistant Nylon Twill OG 106
8415-935-4878	Ex sm short
8415-935-4879	Ex sm reg
8415-935-4880	Ex sm long
8415-935-4881	Sm short
8415-935-4882	Sm reg
8415-935-4883	Sm long
8415-935-4884	Med short
8415-935-4885	Med reg
8415-935-4886	Med long
8415-935-4887	Lg short
8415-935-4888	Lg reg
8415-935-4889	Lg long
8415-935-4890	Ex lg reg
8415-935-6206	Ex lg short
8415-935-6207	Ex lg long

In accordance with CTA 50-900 which superseded CTA 50-905, National Guard, Active Army and Reserve aviators whose primary duty is flying are authorized *two* pairs of the standard A trousers (line item X35980) and *two* shirts (line item TO3002).

Survival Vest Fire Starter

In an issue of the AVIATION DIGEST, I read an article about Army personal equipment and rescue/survival. The standard individual survival vest SRU-21/P, FSN 8465-177-4819, has a fire starter (butane lighter), FSN 9920-999-6753. I would like the manufacturer's name and address, if you can supply it to me. This article will be added to my survival kit.

The fire starter (butane lighter), FSN 9920-999-6753, is no longer available for issue or individual purchase. This item was patented and manufactured exclusively by Gene Goble Associates of California. However, the civilian demand and defense contract procurement were not sufficient to warrant continued production of the fire starter.

General Services Administration is currently evaluating various disposal lighters and hopes to procure a replacement fire starter in the very near future. Until a reliable commercial lighter is approved, we suggest you carry wax-covered matches in a watertight container for starting fires.

Repacking 7-Man Life Raft

My company is required to make numerous overwater flights outside of the Republic of Korea. This company is in the process of inspecting and testing its seven-man life rafts but lacks the necessary publications to complete the repacking of this raft.

Your advice in the U. S. ARMY AVIATION DIGEST, May 1973, was followed and both technical manuals were researched. However, information concerning the repacking of the seven-man life raft was not available. Request that you send two copies of applicable manuals that address the subject.

USAAAVS does not maintain technical manuals for issue. However, this information is contained in chapter 7, USAF T.O. 14S-1-102, which is applicable for Army use.

Paragraphs 3-39a and b and 3-42b(1) and (2), section VII, AR 310-2, dated 5 August 1971, provides guidance on how you may obtain publications from other military services. You may wish to order copies of this T.O. as your unit needs dictate.

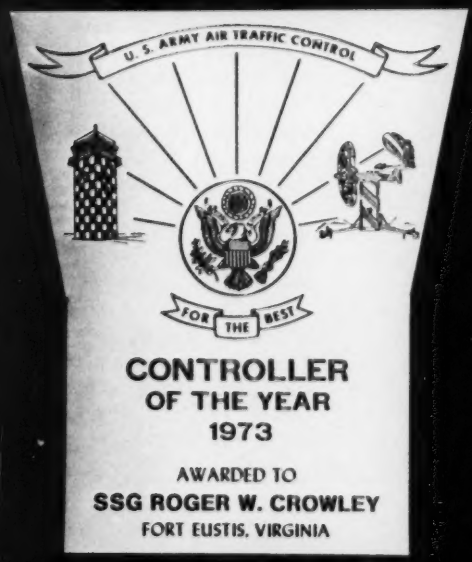
USAASO Sez

The U. S. Army Aeronautical Services Office discusses

The Air Traffic Controller of the Year

CONGRATULATIONS to Staff Sergeant Roger W. Crowley, winner of the 1973 Army Air Traffic Controller of the Year Award. As the Army Controller of the Year, Sergeant Crowley was nominated to the Air Traffic Controllers' Association (ATCA) for its Controller of the Year Award. He competed with controllers from the Federal Aviation Administration, U. S. Air Force and U. S. Navy for this highly coveted award. The ATCA is a national, nongovernment, nonprofit professional association of air traffic controllers, and this was only the second time that an Army Air Traffic Controller of the Year had been considered for this award. Although Sergeant Crowley did not walk off with the top honor, he placed high among the contenders.

Sergeant Crowley has 13 years service as an Air Traffic Controller in the Army. During the past 2 years he has served as the ATC/GCA Chief at Felker AAF, Ft. Eustis, VA. His career is replete with examples of dedicated professionalism—aircraft saves—tornado warnings—long hours of extra duty to provide ATC service to the local flying club. He has consistently provided the leadership essential to a well-managed facility and performed his assigned duties in an outstanding manner. The most recent example occurred on 27 July 1972 when Sergeant Crowley detected a tornado that had formed and appeared on his radar scope as a hook-shaped echo. His alertness in recognition of this phenomenon and his promptness in reporting it to the weather station personnel expedited the transmission of the information to the National Weather Service at Norfolk, VA. The Disaster Control authorities in the Norfolk area were immediately notified and the necessary tornado alert actions were taken. This single act by Sergeant Crowley resulted in saving many lives and countless dollars in property. USAASO is proud to hail "The Air Traffic Controller of the Year, Staff Sergeant Roger W. Crowley."



☆ U.S. Government Printing Office 1973—746-161/5

The modified CH-47 research helicopter (right) is using the fly-by-wire flight control system. The fly-by-wire system is being developed for the Heavy Lift Helicopter to reduce the weight and space penalties of regular flight control systems

Fly-By-Wire System

ON 5 SEPTEMBER 1973 the Boeing Vertol Company flew a tandem rotor research helicopter using a *pure* fly-by-wire flight control system. During this flight the pilot's only means of control was by electrical signals transmitted between the cockpit and the hydraulic actuators which control the forward and aft rotor blades.

The fly-by-wire control system replaces the push-pull rods, bell cranks, cables and pulleys of the hydro-mechanical power boost system which is conventional on large helicopters and airplanes. Hydro-mechanical systems have several problems which are overcome with the electrical signaling of fly-by-wire.

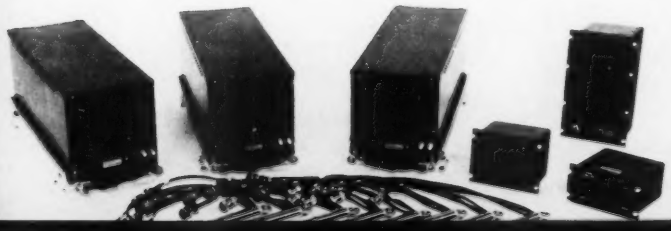
- In a large aircraft for the same safety and vulnerability requirements, the weight and space necessary for the conventional control system are excessive.
- Degraded performance results from non-linearities such as deadband, hysteresis, and backlash which derive from compliance, inertia, and friction.
- Control system problems arise from temperature variation and airframe flexing.
- In military aircraft, the mechanical system is vulnerable to a single ballistic projectile hit. Reducing the vulnerability by redundant mechanical controls increases the already severe space and weight penalties.

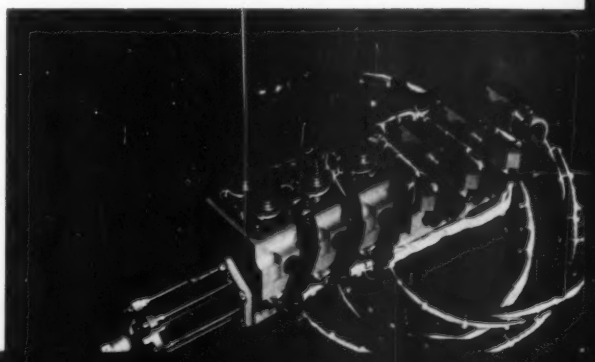
A solution to the hydro-mechanical system problems is the fly-by-wire system also referred to as the direct electrical linkage system (DELS). In the DELS approach aviator (controller) cockpit motions are directly transformed into electrical signals, which are transmitted through aircraft wiring to electronic circuitry in the DELS "black box" (photo below left). The DELS unit provides amplified and mixed control signals which are scheduled for the forward and aft rotor heads. The electrical control signals are transmitted by wire to electro-hydraulic servo actuators which control the rotor blades.

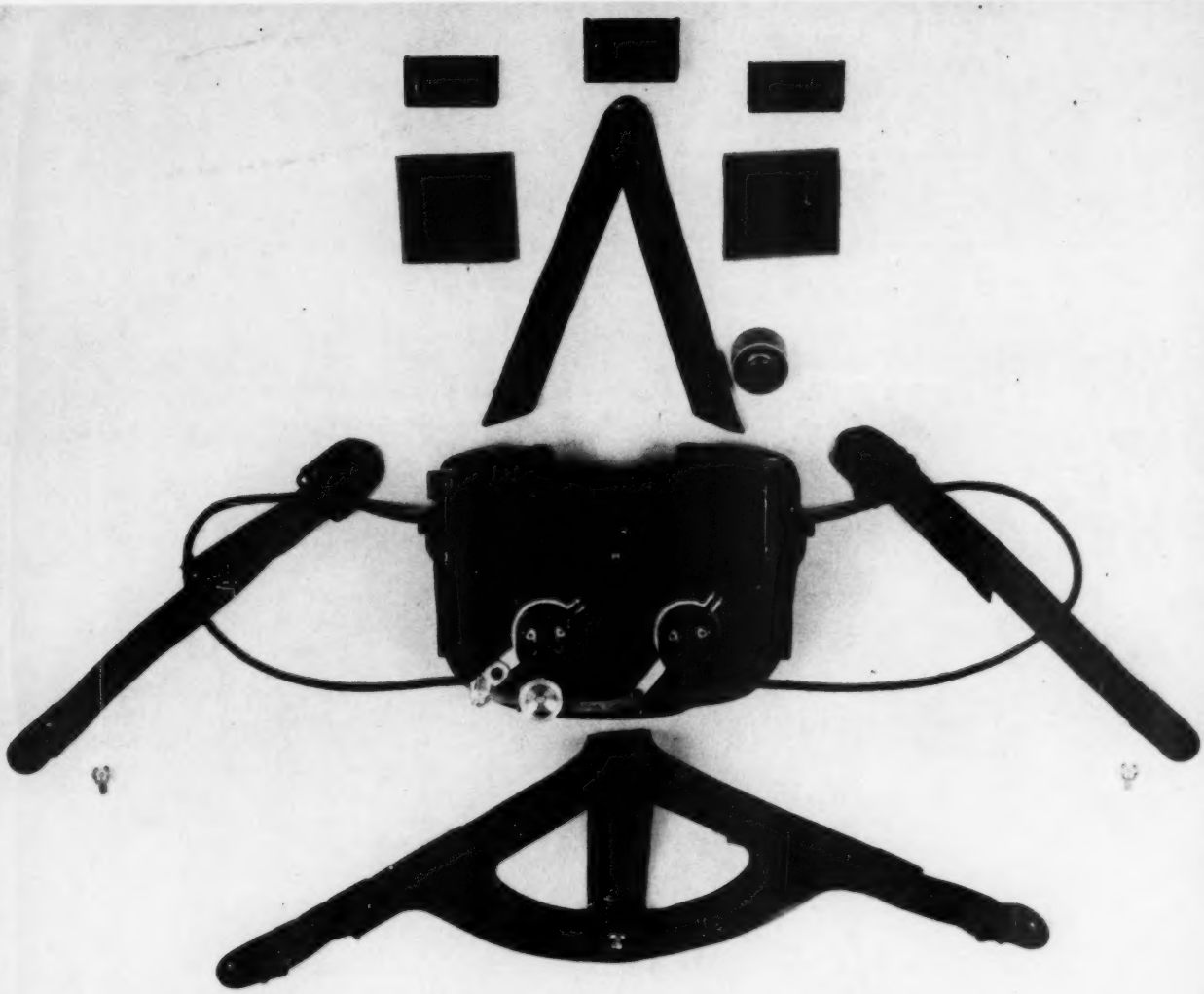
In this fly-by-wire system vulnerability is reduced by employing three redundant channels, any one of which is capable of flight control. The redundancy makes the system more flight safety reliable and particularly important to the aviator if he is in a tactical situation.

The fly-by-wire system was developed by Boeing Vertol Company of Philadelphia, PA, for the U. S. Army's XCH-62 Heavy Lift Helicopter (HLH). The HLH—the first aircraft in aviation history for which a fly-by-wire flight control system is a customer-specified requirement—is currently under development by the company. It will be the world's largest helicopter, capable of lifting up to 35 tons. A prototype HLH is scheduled for first flight in August 1975.

DELS "black boxes" (below) change pilot's cockpit motion to electrical impulses for the drive actuators (below right)

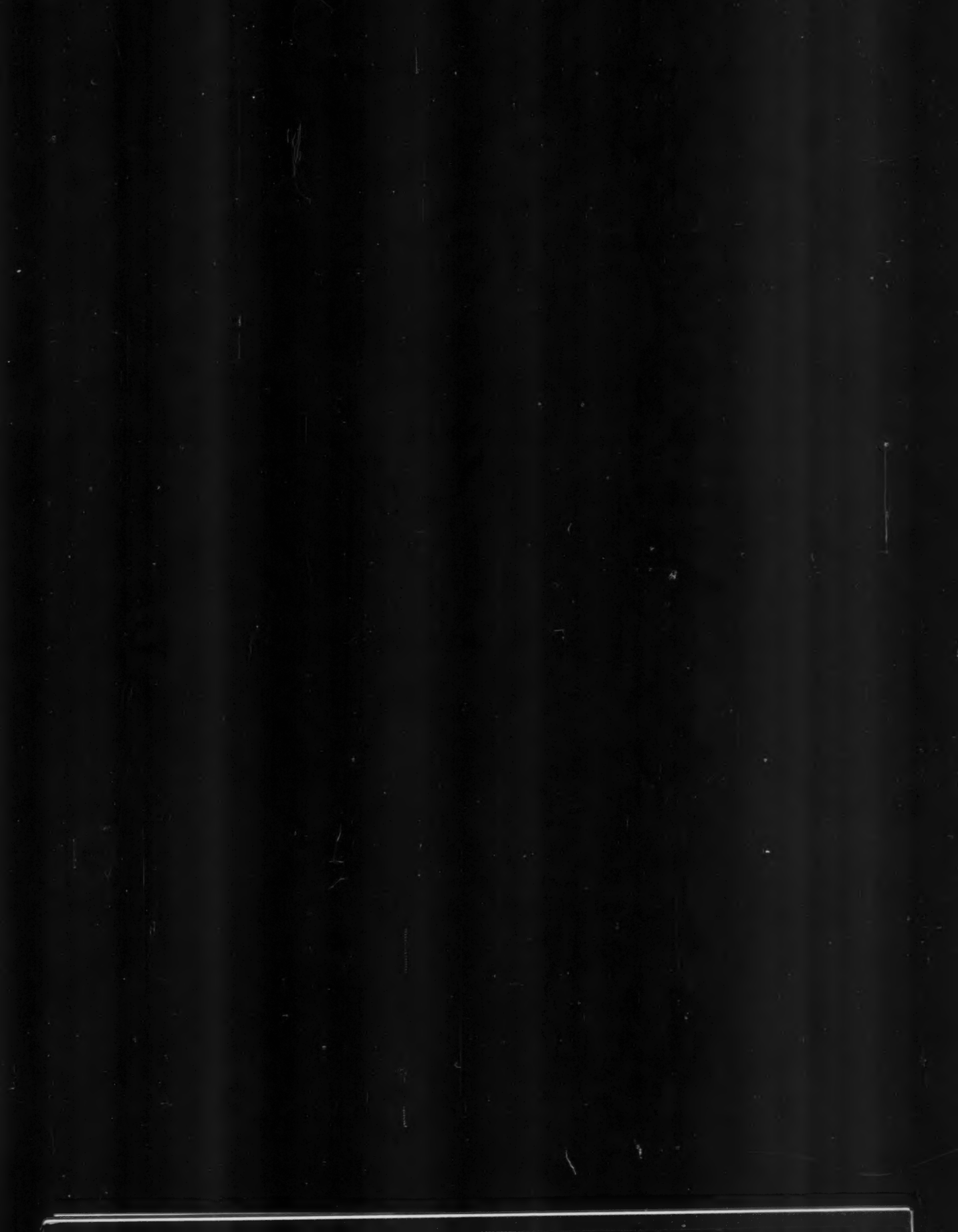






THE AN/PVS-5 night vision goggles are slated for limited production in January. This will provide more goggles for test facility needs and allow wider introduction. The new Universal mask, featuring reversed positions of the battery and switch, is being arctic tested. It's shape is compatible with ground and aviation head gear from the five U. S. services, plus some international aviation helmets.

A 20-minute film comparing the existing systems, giving technical data and showing scenes as viewed through the goggles is available by sending a blank ¾-inch cassette to Mr. Tom Carr at Educational TV Branch, Instructor Technical Division, U. S. Army Aviation School, Ft. Rucker, AL. Reference VTR 411.

There are three add-on innovations which the U. S. Army Aeromed Research Lab at Ft. Rucker, AL, has been evaluating. They also may appear on production models. They include a passive assured on/off switch, a focusing coupler and a bifocal for instant focused map reading.

Other articles about the goggles appeared in the DIGEST in August 1973 ("Concepts And Materiel And CTD"); and May 1973 ("Helicopter Low Level Night Operations" and "How Night Becomes Day").